

Intel Core i5-661 | Zalman
CNPS10X Quiet | Corsair Dominator GTX
DDR3- 2250 6GB

cpu

COMPUTER POWER USER



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GAMER PALADIN Q840

- Intel® Core™ 2 Duo Processor E7500
- Intel® P45 Chipset DDR3 Motherboard
- nVidia® GeForce™ GT 240 1GB Video Card
- Certified CPU Liquid Cooling System - Overclock Proof
- PSI ArmorX Blue Case + 700W Certified Power Supply
- Genuine Windows® 7 Home Premium
- High Definition Surround 3D Premium Sound

\$769



Components included with system



• Intel® Core™ 2 Extreme Processor QX9775	\$2369
• Intel® Core™ 2 Quad Processor Q9650	\$1009
• Intel® Core™ 2 Quad Processor Q9550	\$899
• Intel® Core™ 2 Quad Processor Q9400	\$859
• Intel® Core™ 2 Quad Processor Q8400	\$829
• Intel® Core™ 2 Quad Processor Q8200	\$819
• Intel® Core™ 2 Duo Processor E8600	\$949
• Intel® Core™ 2 Duo Processor E8500	\$849
• Intel® Core™ 2 Duo Processor E8400	\$829
• Intel® Core™ 2 Duo Processor E7500	\$769

• Intel® Core™ 2 Extreme Processor QX9775	\$2799
• Intel® Core™ 2 Quad Processor Q9650	\$1439
• Intel® Core™ 2 Quad Processor Q9550	\$1329
• Intel® Core™ 2 Quad Processor Q9400	\$1299
• Intel® Core™ 2 Quad Processor Q8400	\$1274
• Intel® Core™ 2 Quad Processor Q8200	\$1254

• Intel® Core™ 2 Duo Processor E8600	\$1384
• Intel® Core™ 2 Duo Processor E8500	\$1289
• Intel® Core™ 2 Duo Processor E8400	\$1274
• Intel® Core™ 2 Duo Processor E7500	\$1219



\$1219

GAMER PALADIN Q845

- Intel® Core™ 2 Duo Processor E7500
- Intel® P45 Chipset DDR3 Motherboard
- NVIDIA® GeForce™ GTX-285 1GB Video Card
- Certified CPU Liquid Cooling System - Overclock Proof
- Thermaltake V9 Gaming Case + 700W Certified Power Supply
- Genuine Windows® 7 Home Premium
- High Definition Surround 3D Premium Sound



Components included with system

GAMER PALADIN E850

- Intel® Core™ i5-750 Processor
- Intel® P55 Chipset DDR3 Motherboard
- ATI Radeon™ HD 5850 1GB Video Card
- Certified CPU Liquid Cooling System - Overclock Proof
- NZXT® Tempest EVO Gaming Case + 800W SLI™ Certified Power Supply
- Genuine Windows® 7 Home Premium
- High Definition Surround 3D Premium Sound

\$1239



Components included with system



• Intel® Core™ i7-870 Processor	\$1639
• Intel® Core™ i7-860 Processor	\$1349
• Intel® Core™ i5-750 Processor	\$1239

GAMER PALADIN F725

• Intel® Core™ i7-975 Processor Extreme Edition	\$1809
• Intel® Core™ i7-950 Processor	\$1319
• Intel® Core™ i7-920 Processor	\$1019



\$1019

- Intel® Core™ i7-920 Processor
- Intel® X58 Chipset Motherboard
- ATI Radeon™ HD 5750 1GB Video Card
- NZXT® Guardian 921 Gaming Case with NVIDIA Custom Painted Side Panel + 700W Power Supply
- Genuine Windows® 7 Home Premium
- High Definition Surround 3D Premium Sound



Components included with system

GAMER PALADIN F875

- Intel® Core™ i7-920 Processor
- Intel® X58 Chipset Motherboard
- ATI Radeon™ HD 5970 2GB Video Card
- NZXT® Lexa Blackline Gaming Case + 800W SLI™ Certified Power Supply
- Genuine Windows® 7 Home Premium
- High Definition Surround 3D Premium Sound

\$1629



Components included with system



• Intel® Core™ i7-975 Processor Extreme Edition	\$2409
• Intel® Core™ i7-950 Processor	\$1939
• Intel® Core™ i7-920 Processor	\$1629

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- P9700 (6MB L2 Cache, 2.66GHz) \$1089
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- P8700 (3MB L2 Cache, 2.40GHz) \$949

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- Intel® Core™ 2 Duo Processor
- Intel® PM45 Chipset
- Intel® WiFi Link 5300 Wireless 802.11 a/b/g/n
- 15.6" Wide Screen WXGA TFT LCD 1366 x 768 Display
- ATI M96 Mobility Radeon™ HD 4650 with 512MB Video Card
- 4GB DDR3-1066 Memory
- 320GB S-ATA Hard Drive
- Removable 8x DVD±R/±RW Drive
- GENUINE Windows® 7 Home Premium
- GB Ethernet LAN & 56K Modem
- 3x USB 2.0 Ports; 1x HDMI Port
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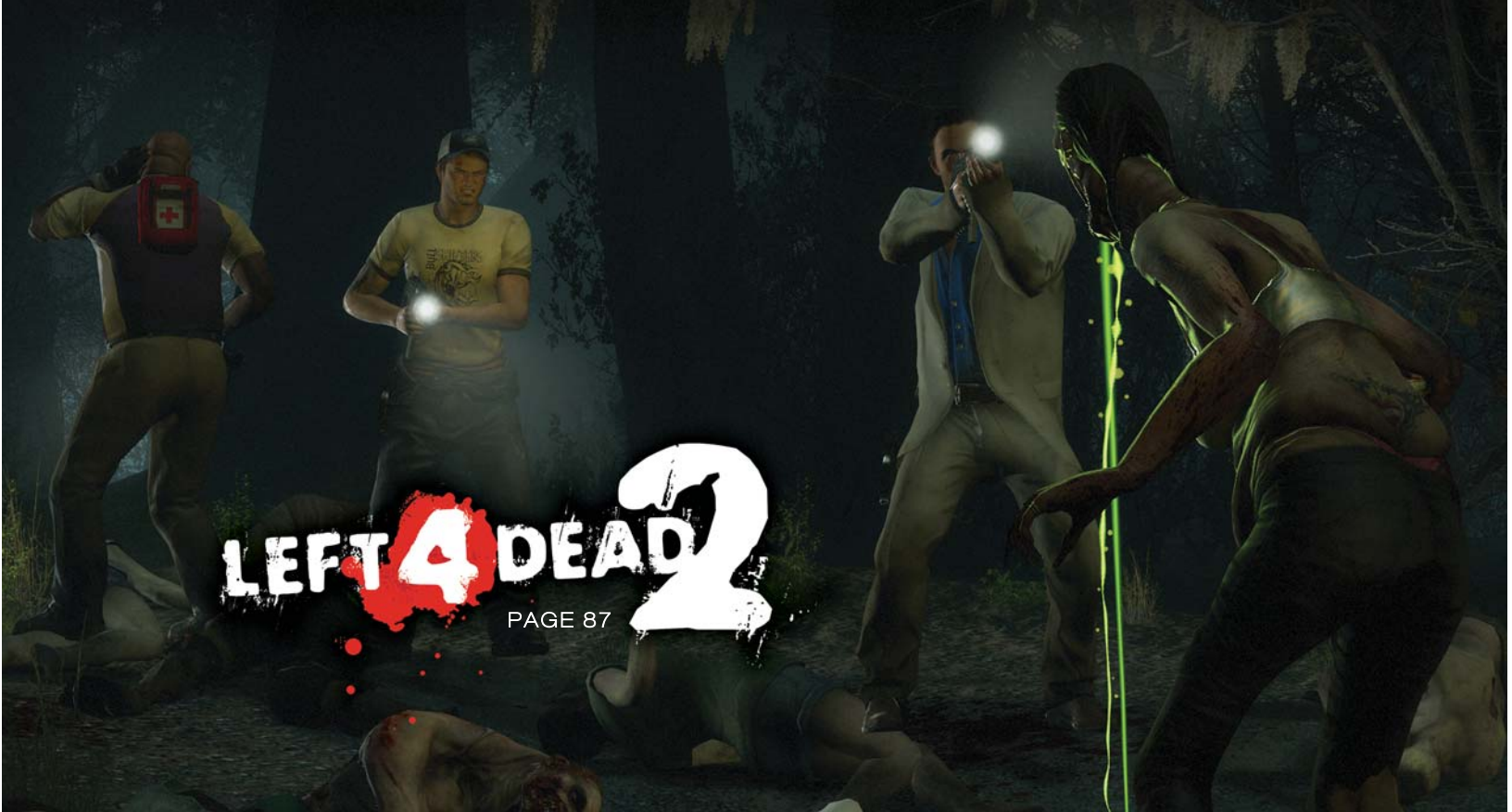
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Into The Arms Of Nvidia

The background image is the cover art for the video game Left 4 Dead 2. It depicts four survivors in a dark, swampy environment at night. On the left, a character in a red vest with a white cross on the back. In the center, a character in a yellow t-shirt and a cap. On the right, a character in a white suit holding a flashlight. In the foreground, a zombie is being killed, with a bright green blood splatter. The title 'LEFT 4 DEAD 2' is prominently displayed in the center, with the '4' in a red splatter. Below the title, it says 'PAGE 87'.

LEFT 4 DEAD 2

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EDITOR'S NOTE

In many contexts, the word “disruptive” has a negative connotation, and depending on one’s point of view, that may be the case in the technology arena, as well, but generally speaking, disruptive technologies are actually a good thing for consumers. Disruptive products and technologies are those that challenge the status quo, sometimes forcing manufacturers and product designers to rethink the way things are done.

When you see major tech firms abruptly changing course and scrapping or delaying product launches, it certainly could mean that there are simply internal forces at work. But sometimes it can mean that the rules have changed, and the players are scrambling to adapt. In some of these instances, it can be a sign that there are good things coming to those of us at the end of the chain.

The new paradigm of chips containing both CPUs and GPUs may be one example of this; it certainly has weighty implications for the mainstream market. I would argue that Lucid’s Hydra multi-GPU technology is of similar import to those of us who fall somewhere beyond the mainstream. In the past, when you were building a high-end PC, you had to choose more than just which video card you wanted to include; you had to choose a “platform,” or graphics ecosystem, which to some extent dictated what motherboard and chipset options you had.

Lucid’s Hydra Engine in some ways throws those old rules out the window. Buying a motherboard equipped with a Hydra 200 chip means you don’t have to scrap your entire build just because you spot a shiny new video card that you’d like to add to your PC, regardless of what you’re currently running and who made it.

It’s still early, of course, and the tech landscape is littered with the remains of similarly catchy ideas that for one reason or another didn’t live up to their initial billing. But early testing seems to indicate that Hydra is the real deal; performance in multi-GPU setups appears to be scaling extremely well, from generation to generation and even when Nvidia and ATI GPUs are hitched together under the Hydra yoke.

And while I understand perfectly why GPU companies would like to encourage you to stay with their products from your initial build through as many upgrades as possible, I think it’s fair to say Hydra is a pretty good thing for them, too. Let’s face it, the “lead” can change hands pretty quickly in this arena, and if the rival of your current GPU’s manufacturer hits a home run, the traditional way of things would discourage you from giving them a shot, even if you are convinced that the new chip is a worthwhile upgrade.

With Hydra, you are free to dip your toe in whatever graphics card pool you like, which to my way of thinking rewards GPU companies that go beyond merely incremental changes from chip family to chip family.

Time will tell how this all works out for Lucid, but one way or the other, the fact that you now have more options when it’s time to add a video card is a good thing for everyone.



Chris Trumble, Publication Editor, *CPU*



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Harmon Kardon Puts Speakers On Ice

Here's what Harmon Kardon wants you to know about its new, hopelessly sophisticated GLA-55 two-piece speaker system: "Every detail . . . from the facets of its bass-reflex enclosures to its custom chrome tubing, has been designed to complement its astonishingly high sonic quality." Whether that's enough to justify \$999.99 is your call. Also know, however, that the GLA-55 sports touch-sensitive volume control and packs several proprietary technologies to bolster audio quality, including Atlas AL and CMMD transducers, Slipstream Port Design ("high output bass with low distortion"), COE (Computer Optimized Equalization), and OCT (Optimized Compression Technology, "[which ensures] clean, accurate sound at high output levels"). ▲



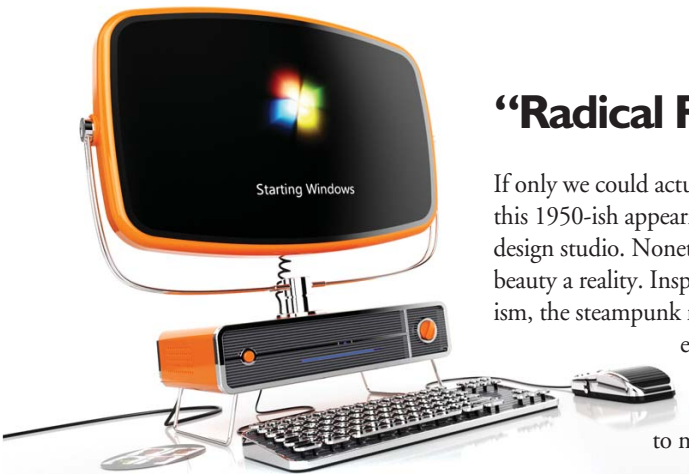
An Eye On The Exemode

Call us suckers, but we love niche products such as Exemode's SQ28m Pocket Digital Camera (\$68) that serve seemingly no fruitful purpose but scream "Buy me anyway!" The keychain-worthy SQ28m measures just 0.9 x 2.2 x 0.74 inches (HxWxD) and weighs less than an ounce but packs several filters to alter the still shots and 8fps 320 x 240 AVI video (no audio, sorry) it shoots via a 1.95MP CMOS sensor. The goods store to either 64MB of onboard storage or to micro-SD cards (2GB or less). Coming in blue or red, the SQ28m also touts a macro mode (as close as 15cm), 39.5mm-equivalent fixed focal length lens, and rechargeable Li-Ion battery. ▲

The Best Places To Ply Your Craft

If you're a Juniper Networks employee, you're probably happy—at least according to Glassdoor.com's Employees' Choice Awards. Based on a 20-question survey that almost 100,000 employees from more than 37,000 companies completed during 2009, Juniper ranks as the top tech company and 10th company overall to work for in the United States. Southwest Airlines topped all companies, netting a 4.7 out of 5 average employee rating. Other list-makers with tech ties include Google (14), NetApp (15), Apple (22), Qualcomm (25), Novell (27), Adobe (29), EMC (33), Rackspace (40), Intel (41), SAP America (43), Intuit (44), and Best Buy (45). CEO-wise, Apple's Steve Jobs earned a 91% approval rating from his employees, while Google's Eric Schmidt received an 87% rating and Intel's Paul Otellini a 72% rating. ▲

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“Radical Reinvention Of The Personal Computer”

If only we could actually sit down at the Philco PC and start banging out a Mickey Spillane-like novel on this 1950-ish appearing marvel. But alas, the Philco PC is a mere 3D rendering from the SchultzeWorks design studio. Nonetheless, the Philco PC begs for a PC maker to step up and make this nostalgic-tinged beauty a reality. Inspired by the 1954 Philco Predicta TV—plus “an eclectic mixture of modern minimalism, the steampunk movement, and antiques”—the Philco PC is a “design aesthetic that blends multiple elements of the familiar, but with some surprisingly fresh styling that just so happens to house a state-of-the-art Windows 7 PC,” states designer Dave Schultze. He adds that “with few exceptions, most computers are engineered eyesores.” Hmm, he needs to meet more modders. ▲

HARDWARE MOLE

Seagate Thins Out, Deals In SSDs

It took Seagate a while, but the world's leading hard drive maker finally got in the SSD game in early December 2009 with the announced release of a new SSD drive line dubbed Pulsar in 50, 100, and 200GB capacities. The 2.5-inch SATA drives have read/write ratings of 30,000/25,000 IOPS and are based on SLC technology. Bad news for consumers, though; Seagate is aiming initial models at the enterprise server market. Consumers *will* be able to get in on 160 and 250GB versions of Seagate's new, December-announced Momentus Thin, a 2.5-inch SATA laptop drive measuring just 7mm thick, or about 25% slimmer than standard 2.5-inch notebook drives. Seagate had yet to announce pricing, but look for drives shipping in early 2010. ▲



Targus Gives Notebooks Some DVI Love

Sure, at \$159.99, Targus' new USB 2.0 Docking Station With Video isn't exactly an afterthought. Still, your money will net you built-in DisplayLink technology (which pumps up the resolution of a docked note/netbook to a maximum 2,048 x 1,152) and a 24-pin DVI connector that supports connecting to external displays at up to 2,048 x 1,152. The ergonomically tilted dock, which is Windows XP/Vista/7-compatible, also has four USB 2.0 ports, including two always-on options suitable for charging peripherals; one Ethernet port; one mic jack; and one audio out port.



Also oozing USB joy is FastMac's TruePower USC Power Outlet With Built-In USB Ports. Available for preorder at \$9.95 each for early 2010 shipping (following final UL approval), the outlets give you two standard three-prong outlet connectors but also two handy USB ports for your charging needs. ▲

Good Tech, Bad Tech At The Movies

As CNN.com's Manav Tanneeru recently pontificated, “Sometimes terrible movies—the ones with such bad acting, dumb dialogue, and cheesy special effects that they're unintentionally hilarious—are the ones we remember the most.” Tanneeru aptly adds that tech-based movies “seem to fail more often than not.” To that end, Tanneeru, along with Steven James Snyder of Time.com's Techland blog; Sidney Perkowitz, an Emory University physicist and writer of “Hollywood Science: Movies, Science and the End of the World”; and Rotten Tomatoes' Matt Atchity, compiled the worst nine tech movies ever. Unfortunate list makers are “Antitrust,” “Feardotcom,” “Hackers,” “Independence Day,” “Johnny Mnemonic,” “The Lawnmower Man,” “The Net,” “Swordfish,” and “Weird Science.” For better tech-related fare, check out Snyder's recent “Best Of The Decade: Sci-Fi Movies” list, which includes our favorite, the brilliant “Primer.” ▲

One Billion & Beyond By 2013

IDC expects the number of Internet-connected mobile devices to pass the 1 billion mark by 2013, which compares to 450 million-plus such users in 2009. About 1.6 billion global users used the Internet in 2009, IDC reports. By 2013, that number should top 2.2 billion people, or roughly one-third of the world's population. Elsewhere, more than 1.6 billion global devices accessed the Internet in 2009 vs. 2.7 billion expected to in 2013. China topped all countries in 2009 with 359 million Internet users and should hit 566 million by 2013. The United States followed with 261 million Internet users last year, with projections calling for 280 million in 2013. IDC projects about 624 million global Internet users will make online purchases in 2009 totaling roughly \$8 trillion. That total could exceed \$16 trillion by 2013. ▲

There's A New National Cybersecurity Coordinator In Town ...

... and his name is Howard Schmidt. It took roughly seven months, but President Obama finally made good in mid-December on a claim he made in May 2009 to name a national cybersecurity czar responsible for shoring up cybersecurity issues in both the military and civilian arenas. Schmidt's resume includes 40-plus years of law, security, and defense experience and previous stints as a cybersecurity advisor to President Bush and high-ranking security positions with eBay, Microsoft, and the Defense Department. At the time of Obama's announcement, Schmidt was president of the Information Security Forum, a 300-member "independent, not-for-profit organization that supplies authoritative opinion and guidance on all aspects of information security." In his new position, Schmidt will answer to the National Security Council and work directly with Obama. ▲

Extra! Extra! Miami Herald Seeks Your Donations

As with many print publications, the *Miami Herald* has struggled recently due to shrinking ad profits and more readers turning to free online news outlets. Although some publications, including *Variety* recently, have begun charging readers to access online content, the *Herald* is going in another direction. In December, it began posting a "Support Ongoing News Coverage" message at MiamiHerald.com reading "If you value The *Miami Herald's* local news reporting and investigations, but prefer the convenience of the Internet, please consider a voluntary payment for the Web news that matters to you."

On a related front, leading U.S. publishers Time Inc., Conde Nast, Hearst, Meredith, and News Corp. banded together in early December to announce an upcoming collaborative online storefront that will sell various full-color publications suitable for reading on touchscreen-enabled devices. ▲

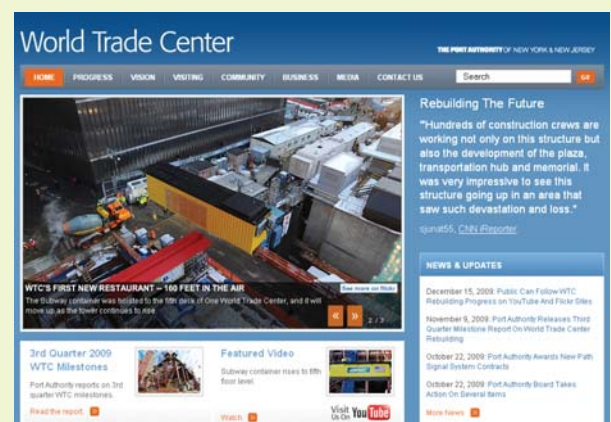
SITE SEEING

"Ataque de Panico!" Indeed

Try telling Fede Alvarez that YouTube isn't the land where aspiring filmmakers' dreams come true. After reportedly spending a year and just \$300 to \$500 to produce his FX-oozing "Ataque de Panico!" ("Panic Attack"), Alvarez posted the 4:48-minute film starring mammoth, missile-launching robots running roughshod over his hometown of Montevideo, Uruguay, to YouTube on a Thursday. By Monday, Alvarez stated he was up to his eyeballs in feelers from Hollywood, including one that supposedly netted him a recent \$30 million deal with Ghost House Pictures, the outfit Sam Raimi ("Evil Dead," "Spider-Man") helps run. Rumor is that the 30-year-old commercial director is now at work on a full-length, big-screen version of "Ataque de Panico!" with Raimi's help. "Ataque de Panico!" had amassed 4.6 million-plus views at YouTube at press time. ▲

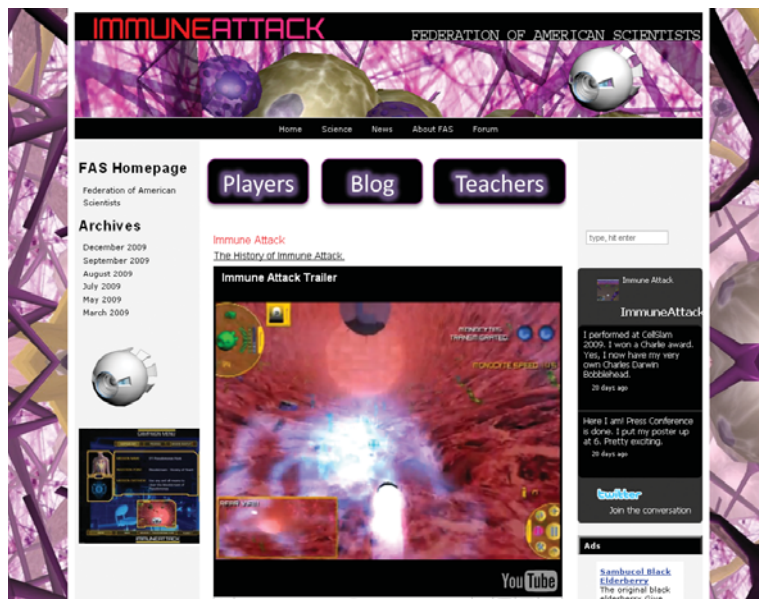
A Work In Progress We Can All Watch

In an effort to "provide transparent, timely information about construction at the World Trade Center," the New York/New Jersey Port Authority recently plastered new video and photos taken from the top of the presently five-story strong One World Trade Center building to the World Trade Center Progress home page (www.wtcprogress.com) and Flickr and YouTube. "The World Trade Center rebuilding effort has a global following, and these sites provide more ways for more people—those in the neighborhood and around the world—to keep an eye on what's happening," stated Anthony Coscia, Port Authority chairman. In addition to up-to-the-minute updates concerning the 16-acre site, the Port Authority is making reports, slideshows, video, and e-alert subscriptions available. ▲



Better Science Skills? Try A Third-Person Shooter

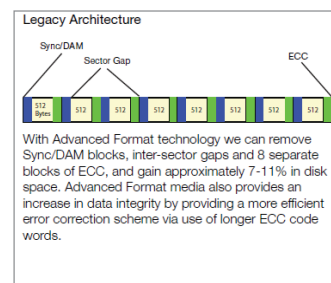
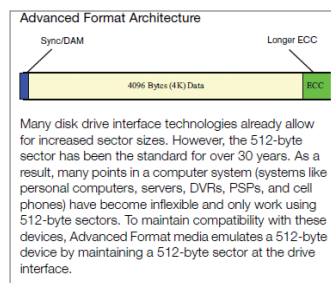
Want to improve your teen's science skills? Get him a copy of the third-person shooter Immune Attack from Dr. Melanie Stegman and Michelle Fox of the Learning Technologies Program at the FAS (Federation of American Scientists) in Washington, D.C. The duo used the game, which involves "navigating the microscopic world of immune system proteins and cells to save a patient suffering from a raging bacterial infection," to evaluate 180 seventh graders. Those who played Immune Attack demonstrated a better understanding of molecular and cell biology. "Additionally, we have used Immune Attack to inspire high school computer programming classes to create their own new video games based on Immune Attack," Stegman stated. Immune Attack is available free at www.immuneattack.org. Version 2.0 is set for an early 2010 release. ▲



WD Advances Hard Drive Format

The days of storing data on mechanical drives in 512-byte sectors are coming to an end. By moving to 4KB sectors, Western Digital's new Advance Format will enable drive makers to eke out 7 to 11% more storage on platters. WD states the technology "improves burst error correction by 50% through the use of larger ECC code word" and is designed to function with "most current operating systems," although not WinXP. WD is offering its Align software for WinXP users, however, which "allows Advanced Format drives operating under WinXP to run at full performance."

WD is expected to turn Advanced Format loose first in its low-power Caviar Green line in 500GB drives. ▲



Duo Brews Up DECAF

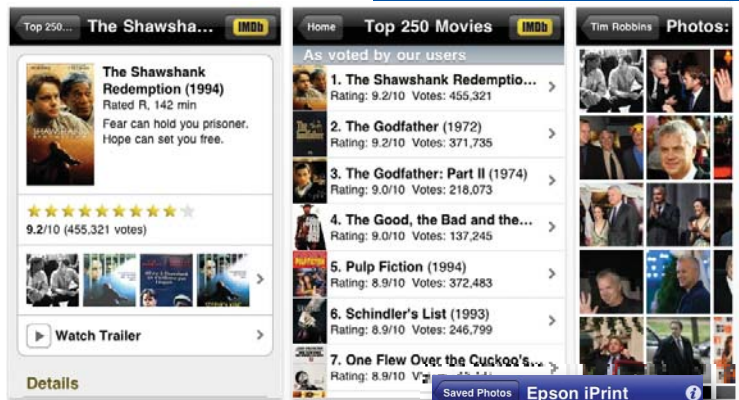
Something tells us the intrigue surrounding the Cofee (Computer Online Forensic Evidence Extractor) tool that Microsoft began offering law enforcement agencies recently and the antidote to Cofee called DECAF (Detect and Eliminate Computer Assisted Forensics) that two anonymous developers created isn't over. The controversy started in November when Cofee's code was reportedly leaked and spread online. DECAF appeared soon thereafter for download touting Cofee-countering abilities. Microsoft reportedly issued a takedown. The DECAF download disappeared at decafme.org. The developers then claimed DECAF was a "stunt to raise awareness for security." Some pundits even claimed DECAF was a phony all along. On Dec. 22, however, the developers posted that "DECAF wasn't fake" but that they "just respect authority and experts in the field and would rather promote a positive move then a negative one." Stay tuned. ▲

SOFTWARE SHORTS

Epson & IMDb Get App Happy

Add Epson to the list of printer makers making goo goo eyes at the iPhone. With Epson's new iPrint app (free), owners of various Epson Artisan, Stylus, and WorkForce models can wirelessly print photos from an iPhone or iPod touch via Wi-Fi and sans driver installation or computer. An automatic printer discovery feature takes care of hooking up with the printer, and printing options include bordered and borderless photos.

IMDb's app (free), meanwhile, currently omits personal ratings and favorites but otherwise touts most of the same goodness as is available at IMDb's full-fledged site, including access to info on 1.5 million-plus flicks, movie times, trailers, and photos. ▲



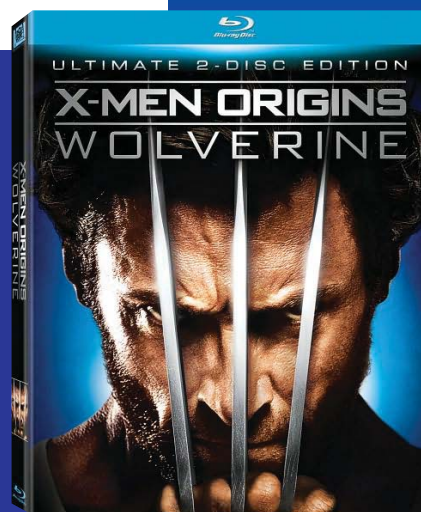
Lenovo Boxes Up ThinkVantage Tools

If you're a ThinkPad or ThinkCentre owner, Lenovo is offering a new tab-based ThinkVantage Toolbox that combines "system health, security, and support services" to keep systems running tip-top. Using PC-Doctor as a platform, the toolbox will be bundled with new ThinkPads and ThinkCentre PCs running Win7. A contextual IMS (Intelligent Messaging Services) feature is included, which PC-Doctor CEO Steve Petracca states is "a predictive, self-healing technology that can diagnose a problem or a performance issue before the user is even aware, and then help them take the appropriate corrective action." ▲

Hollywood Enjoys Banner Year, Continues Hunting Pirates

Based on ticket sales for the 2009 calendar year, the last 12 months have been nothing short of a blockbuster for Tinseltown. According to Hollywood.com, U.S. and Canadian moviegoers forked over \$9.67 billion in tickets as of mid-December. With such flicks as "Avatar" and "Sherlock Holmes" expected to rake in considerable loot through 2009's conclusion, projections are that profits will top \$10 billion for the first time ever and reach \$10.6 billion for 2009. That would top 2007's record of \$9.68 billion in sales.

Still, don't expect the MPAA and law enforcement to let up. Just ask Gilberto Sanchez, a New Yorker arrested in mid-December for allegedly uploading "X-Men Origins: Wolverine" in spring 2009 before the flick's official May release. Reportedly, the upload was watched millions of times before "Wolverine's" official screening. Sanchez has called the charges "just ridiculous. I bought it from a Korean guy on the street for five bucks. Then I uploaded it. I didn't make any money." Sources say Sanchez then cut the interview short and left to deliver a trunkful of stolen "Up" DVDs to a nearby orphanage. ▲



Job Of The Month

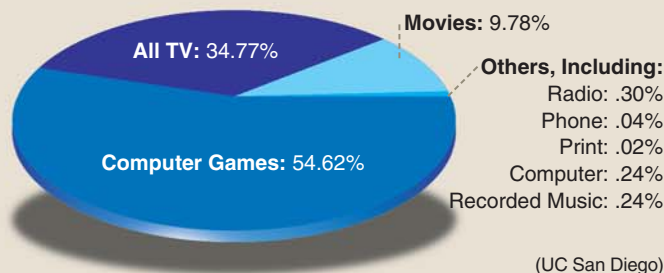
You can be the love doctor of next-generation mobile technology. The next great frontier for online dating is the smartphone (see "Flirt 2.0" on page 82). Match.com is looking for "mobile hackers" to serve as "Senior Application Engineers – Mobile" as the dating service goes on the road. The company wants brash young innovators who may already have brewed up their own iPhone or Android app. Being a "brilliant developer" is a non-negotiable prerequisite, they say. Your main job will be bringing the Match.com brand onto the Android platform and working with that SDK to launch simple and fun apps. All the usual tech cred is needed (Java, SQL, and Android skills). If you have already participated in the Android Development Challenge, all the better, and knowing your way around the iPhone, Blackberry, and Palm platforms can't hurt, either. But Match.com wants to know you are there at crunch time. According to the job description, you need a "love for writing huge amounts of high-quality code while shipping insanely great apps." Ironically, this sounds like it could put a serious crimp in the time you have for a dating life of your own.

<http://www.match.com/cp/careers/job.html?nl=1&jvi=omBeVfwQ,Job&jvk=Job>

The 34 Gigabytes-A-Day Media Diet

New research is showing just how big Americans' appetites—for data—can be. According to the University of Southern California San Diego "How Much Information?" study, each of us consumes 34 gigabytes of data a day when all media are counted. Video games and TV are the biggest media streams when all sources have been normalized into bytes. Annually, every household eats 3.6 zettabytes of data. A zettabyte equals 1 billion terabytes. Super-size me!

U.S. Data Consumption In Compressed Bytes



COD: Modern Warfare 2 Triumphs, But Games Suffer

Despite staggering sales of Activision's Call of Duty: Modern Warfare 2 in November (more than 6 million copies in the United States alone), the game industry just couldn't beat out sales for last year. COD: MW2 shattered worldwide revenue records, grossing \$550 million in its first five days on the market, surpassing the previous record-holder, Grand Theft Auto IV (\$500 million). However, total sales for gaming were down 7.6% in the United States as the holiday shopping season commenced.

Top 10 Video Game Bestsellers (U.S., November 2009)

Game	Platform	Units	M I L L I O N S				
			1	2	3	4	5
COD: Modern Warfare 2	360	4.2 million					
COD: Modern Warfare 2	PS3	1.87 million					
New Super Mario Bros. Wii	Wii	1.39 million					
Assassin's Creed II	360	794,700					
Left 4 Dead 2	360	744,000					
Wii Sports Resort	Wii	720,200					
Wii Fit Plus	Wii	679,000					
Assassin's Creed II	PS3	448,400					
Dragon's Age: Origins	360	362,100					
Mario Kart w/Wheel	Wii	315,000					

(NPD Group)

RAW Numbers Bad Boys Edition

33.1%

Increase in number of complaints filed about online scams filed with the Internet Crime Complaint Center in 2008
(Internet Crime Complaint Center)

3,500+

Number of registered sex offenders recently discovered and eliminated from Facebook
(Financial Times)

17,900

Number of organized phishing attacks conducted against major Web sites recorded in October 2009
(RSA Anti-Fraud Command Center)

35%

Share of phishing attacks on Web sites originating from Canadian hosts in October 2009
(RSA Anti-Fraud Command Center)



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NVIDIA GTX 275 896MB
500W Silent Power Supply

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Powered by a Intel Core i7 Processor

\$352 OFF!



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OVERLOCK**

Base Specifications:

Intel Core i7 920 Processor
3GB DDR3 1600MHz Memory
EVGA X58M Motherboard
NVIDIA GTX 275 896MB
750W Silent Power Supply

» i7 EXTREME²



Powered by a Intel Core i7 Processor

\$632 OFF!



\$2,241

Regular Price \$2,873



**3.6GHz
OVERLOCK**

Base Specifications:

Intel Core i7 920 Processor
6GB DDR3 1600MHz Memory
EVGA X58 LE Motherboard
2x SLI NVIDIA GTX 275 896MB
1000W Silent Power Supply

» i7 EXTREME³



Powered by a Intel Core i7 Processor

\$794 OFF!



\$3,296

Regular Price \$4,090



**3.6GHz
OVERLOCK**

Base Specifications:

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2x SLI NVIDIA GTX 295 1GB
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by Marty Sems

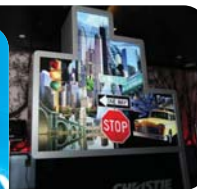
ECOS Harbinger

Cylon hybrids love to call Kara Thrace a harbinger of this and that. This electric supercar (www.ecosmotors.com) looks to be every bit as fast and flashy as Starbuck on a good day, but it's probably much lower maintenance. With an 11-inch motor and carbon fiber/Kevlar/aluminum construction, the ECOS Harbinger vaults to 60mph in just six seconds. A four on the floor and an unlockable 117mph speed cap help the ride slide to a range of more than 150 miles on a charge. Linux controls the motor and Li-Ion battery functions, not to mention driver authentication, touchscreen cabin controls, rearview cameras, the automatic notification to ECOS should a warranty problem arise, the 911 call and GPS beacon should a Raider hit you with a lucky shot, and more. Production should begin shortly after you read this. Refreshingly, an \$89,995 check is all you'll need to imbue your testosterone with a greenish tint. ▲



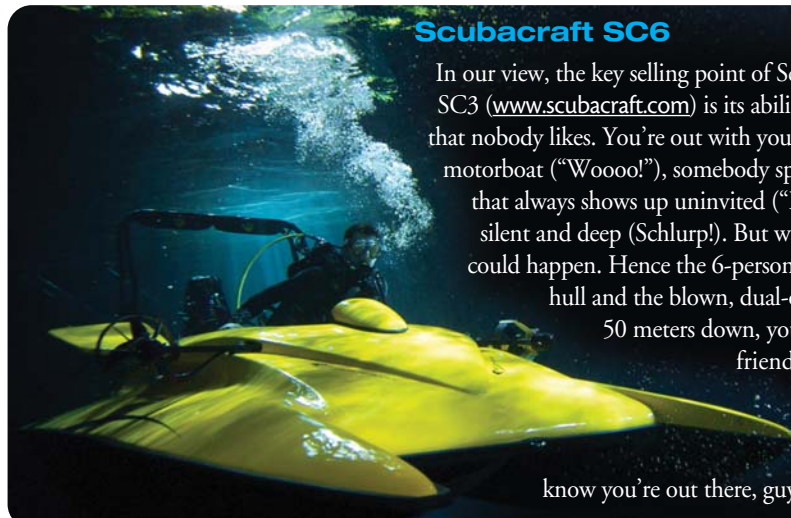
Christie MicroTiles

Videowalls just went DIY. But instead of piecing together off-the-shelf displays and related infrastructure, wrap your brain around these modular blocks from Christie (\$3,795 each; microtiles.christiedigital.com). MicroTiles are the Mega Bloks of display technology. They let you build a videowall as oddly shaped as you need, from a simple rectangle to a Tetris jumble. Each 12- x 16- x 10-inch (HxWxD), LED-powered DLP unit offers high brightness, a low power draw, a broad color palette, and a high pixel count compared to other commercial digital signage options. And because MicroTiles intelligently sense their neighbors, they automatically share the big picture and color-calibrate themselves to match. ▲



Scubacraft SC6

In our view, the key selling point of Scubacraft's 3-person SC3 (www.scubacraft.com) is its ability to ditch the guy that nobody likes. You're out with your two buds on your motorboat ("Woooo!"), somebody spies the irritating guy that always shows up uninvited ("D'oh!"), and a few moments later, you're running silent and deep (Schlurp!). But wait—what if you and your friends have dates? It could happen. Hence the 6-person SC6, still in the concept phase. The twin-tunnel hull and the blown, dual-overhead cammer are good for 50mph up top. At 50 meters down, you'll all be giggling into your air supply at a bikini-friendly 3 knots. Lithium manganese batteries keep the thrusters thrusting for an hour and a half, which is more than long enough for a certain someone to stop yelling "I know you're out there, guys! Joke's over!" and go home. ▲



Ratified & Ready To Rock

802.11n Performance In The Trenches

After seven years and seemingly just as many “pre” and “draft” versions, 802.11n is finally a ratified reality. Of course, September’s final spec publication seems a bit anticlimactic after more than two years of the Wi-Fi Alliance certifying Draft 2.0 hardware, most if not all of which is final spec-compatible. No one expects the arrival of true 11n to yield fantastic leaps in wireless performance. Still, with so many years in the making, it seems more than likely that manufacturers have been able to tweak and tune their routers to levels better than we’ve seen in the past.

Is this really the case? If you have an early Draft 2.0 router, will you benefit from upgrading? For that matter, if you’re still using 802.11g, 11a, or (shudder) 11b, will 802.11n offer enough improvement to justify your hard-earned cash? Performance might be a big part of the answer, but it’s not everything. There are a lot of features present in current routers that weren’t widely available two or three years ago, and some of these might sway you regardless of benchmark results.

We surveyed the field and brought in a collection of today’s top contenders. Is the time right for a new router in your home? Let’s find out.

How We Tested

We set up shop with eight routers, which includes two brands you may not have encountered before. When doing wireless testing, there are two possible paths for dealing with client adapters. Either you can select one client adapter—often the one built into whatever notebook you’re testing with—or else pair the router with a corresponding adapter from the same vendor. There are good and bad points to either approach. In a perfect world, all 802.11n-compliant hardware would be perfectly compatible, and it wouldn’t matter which client adapter

paired with a given router. But this isn’t a perfect world, and we didn’t want to unfairly skew our routers’ results by pairing any of them with a mismatched client. Of course, all hardware is interoperable, but in order to make sure that the routers gave peak results, we felt it was safest to test in same-brand pairs.

There were several options for test environments, but ultimately we wanted a real-world environment with moderate to hostile wireless conditions. We selected a 2,500-square foot, two-story home smack in the middle of suburbia. We tested over a span of five days, during which our client machine registered an average of 10 different wireless networks having at least three out of five signal strength bars. Add to this a typical mix of nearby microwave ovens and assorted 2.4GHz peripherals, including cordless phones. In our host’s home, it was obvious when someone picked up the cordless phone because the throughput on our tests would drop into single-digit range. We unplugged these phones during testing, but there’s no accounting for nearby interference. In situations when performance seemed abnormally low, we retested and discarded the lowest set.

Our test setup involved attaching each router to a PC located in one corner of the home’s ground floor. In order to minimize potential inhibitors to the router’s internal processing, we did not connect WAN ports to the Internet. We used a Dell Latitude E6400 for the test client, plugging each adapter into a USB 2.0 port. Given a current theoretical peak rate of 300Mbps, these 802.11n adapters should have no performance bottleneck issues with the USB interface. We placed the client in three test positions: five feet away from the router with direct line of sight (location 1), about 70 feet away across the ground floor and through one

wall (location 2), and about 40 feet away through the ceiling and one or two additional walls (location 3).

Wireless benchmarking generally looks for two types of information: sustained throughput and latency. It’s important to look at throughput based on real-world as well as synthetic tests, and while latency may not matter on sustained throughput

RT-N16

\$99.99

Asus

usa.asus.com



Specs: Radio: 2.4GHz; Ports: 1 GbE WAN, 4 GbE LAN; Security: 64/128-bit WEP, WPA-PSK, WPA2-PSK, WPA-Enterprise, WPA2-Enterprise, Radius with 802.1x; Interface: 1 USB 2.0

N150

\$49.99

Belkin

www.belkin.com



Specs: Radio: 2.4GHz; Ports: 1 10/100 WAN, 4 10/100 LAN; Security: 256-bit WEP (64/128-bit), WPA-PSK (TKIP), WPA2-PSK (AES) with WPS Push Button

applications, such as large file transfers or streaming media, it can play a key role in tasks such as gaming. We started with the classic real-world transfer test and added a twist. A 500MB transfer is common in Wi-Fi benchmarking scenarios, but there are different ways of approaching it. Some people don't realize that there's a considerable difference between transferring a single 500MB file and dozens of small files assembled into a 500MB folder. Multiple files entail more overhead and will usually take longer to transfer, so it may be interesting to see if different routers do a better job of dealing with this added overhead.

For a synthetic load, we used the very popular Iperf application. Iperf was originally written by the National Laboratory for Applied Network Research as a tool for measuring bandwidth and network quality. We used Iperf alongside Jperf, a nifty, Java-based GUI front-end for the application. Iperf can test using both TCP and UDP traffic. It's important to measure with both because while TCP is the most common protocol used for consumer networking apps, the faster but less reliable UDP is often used for streaming HD media and some games.

Finally, we used SiSoft Sandra's network benchmark module to measure connection latency.

We ensured all routers were running the most current firmware available as of our early December 2009 test window. We only used final firmware releases, not beta versions, DD-WRT, or anything else. We set the routers to their widest possible pipelines, 40MHz in 2.4GHz mode, and set to channel 11, which showed the least amount of interfering traffic in our environment. To eliminate encryption overhead, we did not enable security.

Asus RT-N16

As we go through these reviews, we're assuming that each router comes with all of the modern amenities, such as three antennas, a DHCP server, Web-based administration, NAT and SPI firewall support, basic application QoS, and all of the encryption protocols you'd expect today (namely WEP, WPA, and WPA2). Asus has all this and more, sporting four Gigabit

Ethernet ports, three detachable antennas (so you can replace them with higher gain alternatives), two USB ports, and a WPS (Wi-Fi Protected Setup) button for dummy-proof encryption implementation.

Although Asus' aesthetics are a study in bland, the insides carry the day. A 480MHz processor promises essentially unlimited P2P feeds. The USB ports let the unit work as a print server and FTP server via attached storage. Integrated FTP, HTTP, and BitTorrent protocols let the unit continue file transfers even if a local PC isn't present. Asus could use some help in making these functions more accessible, but patient students will be rewarded.

N1 Vision

\$149.99

Belkin

www.belkin.com



Specs: Radio: 2.4GHz; Ports: 1 GbE WAN, 4 GbE LAN; Security: WPS, WPA, WPA2-Personal, 64/128-bit encryption, multiple SSID

WRT610N

\$139.99

Linksys

www.linksysbycisco.com



Specs: Radio: 2.4GHz, 5GHz; Ports: 1 GbE WAN, 4 GbE LAN; Security: 64/128-Bit WEP, WPA, WPA2, WPS button; Interface: 1 USB 2.0

Like most of the routers here, the RT-N16 is 2.4GHz only, so it's left to compete with all the other wireless devices in our environment. With weaker antenna technologies, you see this interference wreak particular havoc over longer connection distances, especially in our location 3 tests. Asus fares well enough in our speed tests, scoring in the middle to upper-middle of the group. Relatively speaking, the RT-N16's strength is in close-quarters testing (location 1)—check out that 131Mbps UDP rate in iperf. But this is small praise, as most users would simply run RJ45 across such a short distance. We do like that the latency numbers are low and stay consistently low as distances increase.

Using current official firmware, the N16 is an average performer with a fair price and solid features enthusiasts ought to appreciate.

Belkin N150

You might notice that the N150 only has one antenna while other 802.11n routers have three. That's because this, like other "150" routers you'll see, isn't actually bona fide 802.11n. Sure, it uses 802.11n protocols, but it's actually only certified to be 802.11b/g-compliant. This unit (and the router from TP-Link) was one of the main reasons we wanted to use same-manufacturer router/client adapter combos, because it's one thing to mix certified gear and another to change true 802.11n parts with something . . . else.

The entire reasoning behind "150" parts is hitting that magic sub-\$50 mark. This isn't necessarily a bad thing. If all you do is Facebook and email, you'll never know the difference between a proprietary 150 router and true 802.11n. And you probably won't mind that the N150 lacks several firewall, parental, and VPN passthrough controls because all of the main router requisites are still here. Will you mind only having four 10/100 ports? Nah. The N150 has WPS and a 40MHz channel mode. You're fine.

And the really weird thing is that the N150's performance isn't totally terrible. In fact, as you'll shortly see, the N150 actually outperformed our Belkin N+ in several tests. The N150 definitely shows

some weak spots with distance, but latency really isn't one of them. Like the N+, the N150 showed incredibly haphazard throughput, wildly fluctuating between lows and highs. This makes the router a poor choice for media streaming, but for basic file transfers and such, the average throughput is better than we expected, provided you use the N150 Enhanced Wireless USB Network Controller, which is *also* \$49.99. (That's the catch.) Expect lower performance with a different adapter. For the router alone, though, you'll find the price attractively low if your expectations are, too.

Belkin N1 Vision

A value proposition in two words: eye candy. The N1 Vision stands (literally) apart from all other 11n routers, featuring a 3x3 antenna array (three send, three receive) behind an LCD and 4-way control pad. The display can show real-time WAN upload and download speeds, connected client IDs and speeds, time and date, and more. This combined with WPS and the CD-less installation process makes the N1 Vision one of the friendliest routers we've ever seen. Additionally, we really like Belkin's implementation of a separate "guest" SSID to help keep sporadic visitors off of the main network.

With four GbE ports and a high-end price tag, we thought the N1 Vision would storm our benchmark tests. Instead, the performance was strangely erratic. The triple antenna performed almost like a single antenna setup, obviously preferring close-range work but oddly performing better in our more distant location 3 than location 2. Iperf showed decent sustained throughput but at half the speed we'd expected. We double-checked this with Bandwidth Monitor and found that transfer rates were jittering all over the map between zero and nearly 60 Mbps.

Latency numbers show the N1 Vision struggling, and the router pulls in the worst iperf numbers in this roundup on both TCP and UDP. We wouldn't even trust this unit with a single standard-def video stream. Easy setup and pretty looks will only get you so far in life without

performance to match, and the N1 Vision simply fails to deliver.

Linksys WRT610N

Linksys has a hit-and-miss history with routers, but the second-gen WRT610N is a smash success, easily proving itself the best enthusiast-class router available today. The Cisco Setup Wizard combined with a free, basic version of Network Magic make setup and management fairly intuitive for novices, but where wizards fail, manual control continues with relative ease. This is also one of the strongest media routers we've used, combining FTP and UPnP server capabilities with one USB storage port and Cisco's Media Optimized Network technology. The WRT610N can not only give media

traffic a higher priority but also assign preferential treatment to individual clients with regard to media traffic.

We really liked the glossy, curvaceous look of the WRT610N, preferring having the antennas built into the frame rather than wagging about like three confused fingers. Four GigE ports, WPS, and the other usuals round out the list of features.

What's unusual is Linksys' dual-band performance. Simultaneous dual-band means the router can communicate to one client (or more) on the 2.4GHz band and another on 5GHz. The two bands can't be bonded for a single client, but you can, for example, put your video streaming on 5GHz and the rest of your data on 2.4GHz. Our file transfer tests only yielded one result below 50Mbps, which is outstanding. Latency stays consistently low over distance, and the iperf 2.4 results showing sustained performance around 80Mbps+ (TCP) and 150Mbps (UDP) are mind-blowing considering the amount of interference around us. If anything, we're at a loss to explain why the router's 2.4GHz performance in iperf exceeds its 5GHz results.

There's no question: If you want dual-band and can deal with a \$100+ price, the WRT610N is the router to buy.

Netgear WNDR3700

Based on recent stellar experience with Netgear's 5GHz bridge kit, we expected the WNDR3700 to go toe to toe against Linksys and perhaps even rule this roundup. The router is simultaneous dual-band and supports up to four SSIDs. It's fueled by a 680MHz processor and eight internal antennas. With four GbE ports, support for ReadyDLNA media streaming, and some excellent QoS features, this unit should sail.

And that's why we wonder if we ended up with either a semi-defective router or adapter (WNDA3100; \$79.99). Netgear's location 1 results are decent enough, but the addition of distance and obstacles cripples the router's performance. Look at what going up through the ceiling does to the latency and iperf 5GHz numbers.

There are a lot of things to like in this unit, performance aside. We especially love

WNDR3700

\$189.99

Netgear

www.netgear.com



Specs: Radio: 2.4GHz, 5GHz; Ports: 1 GbE WAN, 4 GbE LAN; Security: WPA/WPA2-PSK and WPA/WPA2 Enterprise, multiple SSID, WPS button; Interface: 1 USB 2.0

MediaFlex 7811

\$199

Ruckus Wireless

www.ruckuswireless.com



Specs: Radio: 5GHz; Ports: 1 10/100 WAN; Security: WPA, WPA2 (AES)

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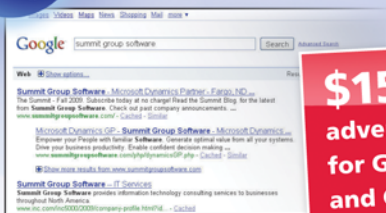
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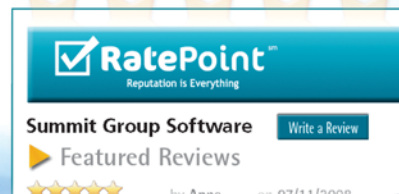
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the storage and access features. Rarely have we seen a router make it so easy to access files from direct-attach storage. The on-board setup screen provides an IP address you punch into any browser (smartphone browsers included) for file access from anywhere. It's a lot of functionality for a very low learning curve. Subsequent testing with our Dell's internal 802.11n adapter showed throughput results roughly double what we saw with Netgear's adapter, leading us to believe we have a flawed USB part. However, using a non-Netgear adapter only for Netgear would invalidate our methodology, so our test results must stand for now.

Ruckus Wireless MediaFlex 7811

Although you can buy Ruckus gear through a few outlets, it is primarily aimed at service carriers looking to deploy broadband-oriented video solutions in subscriber homes. We've looked at the 7811 in *CPU* before (see page 28 in the September 2009 issue), but this is the first time we've shown it in a large roundup. Thus, the numbers need some explaining.

Ruckus has the most advanced beam-forming technology available on today's wireless market. The company implements an intelligent antenna array within its taco-shaped 802.11n access point (the 7811) and adapter (the 7111, \$139) to narrow and amplify the connection between the two points while blocking out other 5GHz traffic. This isn't a router, nor does it support 2.4GHz. It's designed for streaming video and maintaining minimum throughput while competitors focus on maximizing average throughput. You only see hints of this difference in our test results. In location 1, Ruckus clearly underperforms Linksys and Netgear, but again, this result is more theoretical than practical.

Whereas most routers fall off in performance over distance, Ruckus is a rock. The access point is rated to cover a 4,000-square foot house. You can see this in the long-range tests, as the 7811 makes averaging 40Mbps at this extreme range look easy, and final iperf numbers show averages above 80Mbps. If anything, Ruckus' beamforming benefits from distance.

If you're streaming HD video across a home, the 7811 is the best wireless offering.

Its effectiveness as a general-purpose AP depends on your applications and existing router/switch.

TP-Link TL-WR741ND

After having seen Belkin's 150Mbps 1x1 design, the second verse from TP-Link will seem familiar. "N power and G price" is the mantra here, and TP-Link dispenses with nearly everything that isn't nailed down. The four LAN ports are 10/100, and there are no USB ports for any sort of storage or printer sharing, although it does support dynamic DNS. Integrated menus and setup are laudably intuitive, and there are a few extras, such as parental controls, basic QoS, encryption, and button-based security setup.



TL-WR741ND
\$39.99
TP-Link
www.tp-link.com
● ● ●

Specs: Radio: 2.4GHz; Ports: 1 10/100 WAN, 4 10/100 LAN; Security: WPA/WPA2, "QSS" setup button (like WPS)

X550N
\$89.99
ZyXEL
us.zyxel.com
● ● ●



Specs: Radio: 2.4GHz; Ports: 1 GbE WAN, 4 GbE LAN; Security: WPA, WPA2, WPS button

Throughput with the TL-WR741ND was an erratic mess, seeming to spend most of its time around 7Mbps but often throwing up spikes into the 30 to 40Mbps range. Nevertheless, performance is roughly on par with Belkin's 150 counterpart. Ultimately, you have to decide if the Belkin name is worth \$10. TP-Link's unit is a fair choice when compact size, even smaller price, and only basic functionality are needed. Would we pay another \$10 for TP-Link's true 802.11n model? In a heartbeat.

ZyXEL X-550N

We're guessing that ZyXEL took one less router cosmetics course than Asus did, but the company apparently logged in the extra homework on performance. ZyXEL shaves 10% off of the RT-N16's price, and the X-550N pulls in about the same performance on file transfer times. It takes a clear lead in iperf. Mind you, the sustained throughput graphs look pretty mountainous, but the TCP numbers bottom around 25Mbps and typically float in the 50s; UDP numbers almost double this.

On setup, ZyXEL does a decent job keeping things simple. We'd be surprised if you spent more than five minutes setting it up. If you want to manually control the advanced security and access features, though, you might be in for some manual reading and a fair bit of rebooting. We were very pleased with the QoS features for tweaking different traffic types, and being able to schedule the radio to shut off at given times is less a "green" feature and more a smart security play, perhaps reflecting ZyXEL's roots in the business products space. This might also be why the X-550N supports two IPSec VPN tunnels.

On the other hand, ZyXEL's business pedigree might also explain why this router omits USB ports, which have historically been a consumer-centric feature. On special, you can find the X550N for about \$70, and at that price it's a steal if all you need is solid 2.4GHz performance across a house. At regular price, though, the X-550N is a bit unexceptional.

What We Found

The best news is that most 802.11n routers are now capable of sustaining at

least one, and quite often two, HD video stream across house-sized distances, especially if your application uses UDP. The worst news is that 2.4GHz wireless remains plagued by problems. In order to get reliable data, we had to eliminate interference sources within our environment; one cordless phone call was all it took to blow up a test run. A 5GHz connection can often remedy this, but 5GHz is range-limited,

and we remain perplexed by the lack of support for 5GHz among vendors.

Performance results aside, we were very impressed with the features found on today's 802.11n routers. Clearly, making network-attached storage easily accessible is a big focus in the industry. Setup headaches have now practically vanished, and Gigabit ports, once a luxury, are now all but mandatory. We also appreciated how slick extras such as guest SSIDs and

integrated BitTorrent support are becoming more common.

Bottom line: If you still have an early Draft N router from the 2007 era, much less an 802.11a/b/g router from earlier times, an update will likely give you a lot more performance and functionality. Just make sure you shop for the real goods and not empty eye candy. ▲

by William Van Winkle

Victory Through Air Power

We ran our seven routers and Ruckus Wireless' MediaFlex 7811 through a demanding gauntlet of tests to determine which unit would claim 802.11n supremacy. We tested both routers' radios when applicable and used same-manufacturer wireless adapters. Our 500MB file transfer and Jperf results are listed in Mbps; SiSoft Sandra Network results are reported in ms (milliseconds latency).

	Asus RT-N16	Belkin N150	Belkin N1 Vision	Linksys WRT610N	Netgear WNDR3700	Ruckus Wireless MediaFlex 7811	TP-Link TL-WR741ND	ZyXEL X-550N
Adapter	USB-N13	F6D4050	F5D8055	WUSB600N	WNDA3100	7111	TL-WN721N	NWD210N
Location 1 (2.4GHz)								
500MB (single large) transfer	55.224	49.206	66.8	63.133	30.193	N/A	35.148	62.542
500MB (many small)	48.57	43.256	66.5	55.775	29.186	N/A	32.196	48.561
SiSoft Sandra Network	1.4	1.1	1.25	1.32	1	N/A	1.42	1.35
Jperf (TDP/UDP)	82.154/131.16	64.105/72.105	68.6/64.7	96.068/156.215	63.822/53.502	N/A	48.852/90.798	83.689/92.456
Location 2 (2.4GHz)								
500MB (single large) transfer	43.563	35.817	23.763	58.07	25.13	N/A	29.597	55.862
500MB (many small)	41.327	14.353	24.049	53.75	23.098	N/A	26.827	48.535
SiSoft Sandra Network	1.36	2.14	1.77	1.2	1	N/A	2.46	1.12
Jperf (TDP/UDP)	34.33/53.95	40.971/63.048	18.366/19.853	82.815/145.476	46.631/35.289	N/A	40.483/81.818	72.727/98.944
Location 3 (2.4GHz)								
500MB (single large) transfer	42.231	30.615	49.318	53.021	28.961	N/A	27.417	41.39
500MB (many small)	45.457	28.901	40.653	63.078	29.208	N/A	28.059	35.669
SiSoft Sandra Network	1.36	1.77	4.15	1.2	5.2	N/A	2.44	2
Jperf (TDP/UDP)	47.95/62.198	45.682/66.214	26.449/24.453	78.121/157.052	52.36/44.51	N/A	45.03/86.32	57.813/78.853
Location 1 (5GHz)								
500MB (single large) transfer	N/A	N/A	N/A	75.552	65.158	56.131	N/A	N/A
500MB (many small)	N/A	N/A	N/A	63.375	47.032	23.293	N/A	N/A
SiSoft Sandra Network	N/A	N/A	N/A	1	0.85	1	N/A	N/A
Jperf (TDP/UDP)	N/A	N/A	N/A	98.179/137.2	94.511/82.285	76.273/87.94	N/A	N/A
Location 2 (5GHz)								
500MB (single large) transfer	N/A	N/A	N/A	55.63	47.106	63.233	N/A	N/A
500MB (many small)	N/A	N/A	N/A	50.259	41.315	52.837	N/A	N/A
SiSoft Sandra Network	N/A	N/A	N/A	2	0.94	1	N/A	N/A
Jperf (TDP/UDP)	N/A	N/A	N/A	61.909/79.013	68.049/57.546	88.048/87.134	N/A	N/A
Location 3 (5GHz)								
500MB (single large) transfer	N/A	N/A	N/A	58.74	19.782	63.649	N/A	N/A
500MB (many small)	N/A	N/A	N/A	44.112	18.561	56.277	N/A	N/A
SiSoft Sandra Network	N/A	N/A	N/A	1.8	3.75	1	N/A	N/A
Jperf (TDP/UDP)	N/A	N/A	N/A	76.149/117.892	25.064/35.62	89.896/88.333	N/A	N/A
Price	\$99.99	\$49.99	\$149.99	\$139.99	\$189.99	\$199	\$39.99	\$89.99
CPUs	●●●●	●●●	●●	●●●●●	●●●	●●●●	●●●	●●●

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Making Sweet Music Together

Steinberg Cubase 5 Advanced Music Production System
& Yamaha Steinberg CI2 Advanced Integration USB Studio

The latest version of Steinberg's popular Cubase software, Cubase 5 Advanced Music Production System, is far more than a mere multitracker with some nifty plug-ins. This is a serious software package, engineered to run on a Mac or PC (from the same installation DVD) that comes armed with a slew of powerful tools to satisfy your every audio-related need. Cubase 5 lets you record, notate, and compose; record, edit, and mix; process effects; and use MIDI and virtual instruments.

It is not possible in this space to even mention in brief all of the features built into Cubase 5. It's a tool for true professionals, but unless you have extensive audio needs and require a heavy-duty professional tool, Cubase 5 is overkill for you. You would probably be better off with a more basic Cubase product.

Although capable of both, notation and mixing aren't necessarily Cubase 5's strongest points. That's not to say that they're weaknesses *per se*, but they're overshadowed by other impressive features, including VST3 support; VariAudio, a powerful audio editor that even converts digital audio to MIDI events; Pitch-Correct, to control intonation on vocal and instrumental recordings; LoopMash, Groove Agent ONE, and Beat Designer for working with loops and drum samples; and REVerence, a reverb unit that is chock full of features, including a host of options for environment emulation, from a recording studio to a football stadium. It even includes software called Rebeat that's designed to help you sell your music online at sites such as iTunes and Napster.

With this release, Steinberg focused on cleaning up the aesthetics of the software and its many built-in tools. Cosmetics weren't so much the focus as was the



Cubase 5

\$499.99

Yamaha Steinberg CI2 Advanced Integration USB Studio

\$249

Steinberg

www.steinberg.net

Specs: 2 combination XLR and 1/4-inch inputs (1 HI-Z); foot switch jack; headphone jack; stereo 1/4-inch outputs; +48 phantom power switch

attempt to make the tools, menus, and controls easier to use, and it shows. The interfaces look sharp and feel fairly intuitive, which is not necessarily a strength of most DAW applications.

Cubase 5 is truly a complete DAW, with tools that can render several pieces of software in your arsenal obsolete. Make sure you have a speedy and powerful computer to take advantage of all the features in Cubase 5.

That said, if you want a leaner version of what is essentially the same software, you can opt for Cubase AI 5, a compact version of Cubase 5 that still features up to 48 audio tracks (or 64 MIDI tracks) for recording, dozens of VST effects, and HALion ONE software samples. For a slimmed-down version of Cubase 5, the Cubase AI 5 interface is a little cluttered for my taste; although I'm aware that it's supposed to be simpler than the full version of Cubase 5, it doesn't feel that way.

Yamaha Steinberg CI2 Advanced Integration USB Studio

Designed specifically to work with Cubase AI 5, the Yamaha Steinberg CI2 Advanced Integration USB Studio recording interface is the most desirable part of this package deal. Tiny and easily portable, the CI2 is an ideal tool if you record live or simply have limited studio space. The device is powered only by the USB

bus, so there's no power adapter to worry about. Therefore, you can record with this device on a laptop running on battery power.

The CI2 features two instrument or microphone inputs (they each double as 1/4-inch and XLR jacks) with phantom power, a foot switch input for hands-free control, a headphone jack, stereo outputs, and a handful of physical controls. One item that it does lack is MIDI ports, so if you need an interface that supports your keyboards and MIDI controllers, look elsewhere.

The primary control on the CI2 is the AI Knob, which you can use as an input device to navigate the Cubase AI 5 software. It also coordinates with the mouse pointer; for example, if you point to, say, a fader in the software, you can control it with the AI Knob. For anyone who has grown weary of fiddling with graphically pleasing but ergonomically flawed software controls, the AI Knob is a welcome tool.

Steinberg makes excellent DAW products, and the CI2 is a fine hardware complement. If you're interested in pro-level audio software, Cubase 5 is a great tool, but if you're looking for recording software for the novice, Cubase AI 5 with the Yamaha CI2 is a better purchase. ▲

by Seth Colaner



LIMITLESS IMAGINATION

Introducing the all new chassis line from NZXT, the Beta EVO, M59 and the Lexa S. These new cases showcase a blend of extreme, sleek and traditional design, yet still giving our customers the best balance in price versus performance. All of these are fitted with black interiors, cable management systems, two 140mm top exhausts, and bottom mounted PSU.

Keep cool this winter with the new Sentry 2 temperature display. This latest addition to NZXT's temperature displays sports a touch screen with support for 5 fans up to 10 watts per channel. It is a cool addition to any chassis.

Let your imagination flow this winter, and build your next PC with NZXT.

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NCIX.COM

Canada Computers

ASI

Windows®. Life without Walls™, CyberPower recommends Windows 7

www.cyberpowerpc.com



Gamer Xtreme 2000

Intel® Core™ i3-530 Processor
Genuine Window 7 Home Premium 64 Bit Edition

MB	Intel® H55 Chipset Mainboard
RAM	Corsair® 4GB DDR3 1333 Dual Channel Memory
HD	1TB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
VGA	NVIDIA® GeForce® GT 240 1GB DDR3
CASE	Nzxt M59 Gaming Tower Case w/ 600 W Power Supply



\$715



Gamer Xtreme 1000

Intel® Core™ i3-530 Processor
Genuine Window 7 Home Premium 64 Bit Edition

MB	Intel® H55 Chipset Mainboard
RAM	Corsair® 4GB DDR3-1333 Dual Channel Memory
HD	500 GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
VGA	NVIDIA® GeForce® GT 220 1GB
CASE	Apevia X-Crusier 2 Gaming case with 3 Meters & Controls 420 Watt Power Supply



\$645



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Gamer Infinity 8800 Pro SE

Intel® Core™ i7-920 Processor
Genuine Window 7 Home Premium 64 Bit Edition

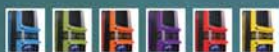
MB	Intel® X58 Chipset Mainboard
RAM	Corsair® 6GB DDR3-1333 Tri Channel Memory
HD	1TB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
VGA	ATI Radeon™ 5870 1GB Direct X 11 Video
CASE	Inwin Maestrom Full Tower Case 800 Watt Power Asetek Liquid Cooling System



\$1545

Intel® Core™ i7 Processor

(8MB L3 Cache, 1066MHz)	
Extreme i7-975 3.33GHz	\$ 2335
i7-960 3.20GHz	\$ 1845
i7-940 2.93GHz	\$ 1685
i7-920 2.66GHz	\$ 1545



Intel® Core™ i7 Processor

(8MB L3 Cache, 1066MHz)	
Extreme i7-975 3.33GHz	\$ 1885
i7-960 3.20GHz	\$ 1399
i7-960 2.93GHz	\$ 1239
i7-920 2.66GHz	\$ 1099

Gamer Infinity HD 5750

Intel® Core™ i7-920 Processor
Genuine Window 7 Home Premium 64 Bit Edition

MB	Intel® X58 Chipset Mainboard Supporting CrossFire™/SLI™
RAM	Corsair® 6GB DDR3-1333 Tri Channel Memory
HD	500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
VGA	ATI Radeon™ HD5750 1GB
CASE	Apevia X-Dreamer 3 Gaming Case / 600 Watt Crossfire™ Power Asetek Liquid Cooling System



\$1099



Intel® Core™ 2 Duo Processor

(6MB Cache, 1333MHz FSB)	
E8500 3.00GHz	\$ 675
E8400 2.83GHz	\$ 655
E7500 2.80GHz	\$ 599

Gamer Infinity 8000 Dream

Intel® Core™ 2 Duo E7500 Processor
Genuine Window 7 Home Premium 64 Bit Edition

MB	Intel G41 Chipset Mainboard
RAM	Corsair® 4GB DDR3-1333 Dual Channel Memory
HD	500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
VGA	ATI Radeon™ HD 4350 512MB Video
CASE	Cooler Master Elite 310 Gaming Case 420 Watt



\$599



Intel® Core™ i7 Processor

(1333/1066MHz)	
8200M 8MB 1.73GHz	\$ 1259
7200M 6MB 1.60GHz	\$ 1065
(1066MHz, L3 Cache)	
620M 4MB 2.66GHz	\$ 1029

Intel® Core™ i5 Processor

(733MHz, L3 Cache)	
540M 3MB 2.53GHz	\$ 945
520M 3MB 2.40GHz	\$ 899

Gamer Xplorer X5-7800

Intel® Core™ i5 520M Processor

Intel® HM55 Chipset
Intel® WiFi Link 5300 802.11 A/G/N

Genuine Window 7 Home Premium 64 Bit Edition

4GB DDR3 PC1333 Memory
320GB SATA150 Hard Drive
15.6" WXGA TFT Display 1366x768 pixels
8X DVD±/-RW Drive
1000/100/10 Network Card & 56K V.92 Fax/Modem
ATI Mobile Radeon™ 4300 512MB
3-in-1 Built-in Media Reader
1 HDMI Port, 1 IEEE-1394 Firewire Port
3x USB 2.0 Ports, 1 PCMCIA Type II Slot
3 Hours Battery Life, Weight only 6.8 Lbs
Free Carrying Case, 6 Custom Colors to Choose From

\$899



Intel® Core™ i7 Processor

(1333/1066MHz)	
Extrem 9200M	\$ 2259
8200M 8MB 1.73GHz	\$ 1665
7200M 6MB 1.60GHz	\$ 1469
(1066MHz, 900MHz, L3 Cache)	
620M 4MB 2.66GHz	\$ 1429

Gamer Xplorer X7-7700

Intel® Core™ i7 620M Processor

Intel® PM55 Chipset
Intel® WiFi Link 5300 802.11 A/G/N

Genuine Window 7 Home Premium 64 Bit Edition

4GB DDR-3 PC1333 Memory
500GB SATA150 Hard Drive
17" WSXGA TFT Display 1680x1050 pixels
8x DVD±/-RW Drive
1000/100/10 Network & 56K V.92 Fax/Modem
NVIDIA® GeForce® GTS 250M 1GB
3-in-1 Built-in Media Reader, 1 HDMI Port, 1 Firewire Port
IEEE-1394 & 3x USB 2.0 Ports, 1 PCMCIA Type II Slot
3 Hours Battery Life, Weight only 7.6 Lbs
Free Carrying Case

\$1429



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CyberPOWER Inc.

Case Appeal AV8

One of the most satisfying parts of building a high-powered gaming machine is showing off the finished product. Case Appeal's AV8 chassis features an open design that places your motherboard at the forefront, making it the ultimate display case for all your components.

The AV8 comes in a variety of color schemes and can be adorned with one of many vinyl graphics, including flaming skulls, dragons, bloody spiders, etc. But if you're looking for a one-of-a-kind case, Case Appeal also offers custom design services.

Each standoff on the AV8's acrylic motherboard tray stands 3/4-inch tall, leaving plenty of room under the motherboard to route cables. There are also several circular cutouts in the tray, creating additional routing options for both cables and water-cooling tubes. Once our motherboard was secure, routing the cables seemed at first a daunting task. But the motherboard tray

can be tilted up and down, which made it easier to access the cutouts and route wires. In order to achieve the clutter-free cable environment intended by the AV8's design, we had to spend some time contemplating the best cable configuration and utilizing trial and error to be successful.

Case Appeal designed the AV8 with building ease in mind. The top, side, back, and bottom panels can be detached by removing a number of screws, and both the hard drive and 5.25-inch drive cages are removable via thumb-screws. We found that if you have a smaller SSD, you'll need a separate expansion bracket, which Case Appeal doesn't currently offer, as there were no screw holes to accommodate our little drive.

Overall, the AV8 seems to have accounted for most of the features you'll need when building, giving enthusiasts a unique way to showcase their system



AV8
\$170 (without custom graphics)
Case Appeal
www.caseappeal.net



Specs: Motherboard compatibility: ATX; Bays: 3 5.25-inch external, 4 3.5-inch internal; Fans: 2 120mm; Expansion slots: 7; Dimensions: 19 x 18 x 12 inches (HxWxD)

hardware that's both functional and aesthetically pleasing. ▲

by Kris Glaser Brambila

Samsung Story Station 1TB

The Samsung Story Station 1TB external hard drive is a capable drive with built-in software for real-time automatic backup, an encrypted partition, and power conservation.

The Story Station has very few exterior bells and whistles, but that doesn't mean it's an ineffective product. The matte gray finish coupled with the on/off knob give it an old-school touch; as you further turn the knob, a white LED indicates the power status of the drive. The ventilation on the rear and bottom panels is just enough to keep the temp down, dissipating a large percentage of the heat generated even after hours of active use. And, fulfilling its "green operation" specification, the Story Station kicks into Power Saving Mode if the drive hasn't been active for more than five minutes.

Samsung's Story Station doesn't require software installation. Your PC will recognize the drive automatically and prompt you to activate the backup and safety programs included with the Story Station. Samsung incorporates the Auto Backup

Story Station 1TB
\$115.99
Samsung
www.samsung.com



Specs: Capacity: 1TB; Ports: USB 2.0; Support: Windows 2000 Pro/XP/Vista, Mac OS X 10.4.8 or above; Dimensions: 1.6 x 4.7 x 7.6 inches (HxWxD)

feature (backups can be password-protected) and SecretZone, a solid suite of storage software overall. Auto Backup uses a straightforward "click & backup" method for selecting items for external storage, so real-time backup is a cinch. The encrypted (using AES-128, AES-256, or Blowfish-448) SecretZone is available as a virtual drive for safeguarding any sensitive files you don't want other users to access. The SecretZone software walks you through the steps—size allocation, location, etc.—to setting up a confidential partition.

For the PC Mark Vantage HDD test, the Samsung Story Station scored a respectable 2557. We also ran the Hard Drive Short Bench using HD Tach and clocked the average read speed at 34.2MBps. So, taking into account the construction, software package, capacity, and performance, the Story Station should meet the expectations of anyone who needs some massive storage capacity and data protection. ▲

by Joanna Safford

Intel Core i5-661

Intel continues its mainstream product offerings with the Intel Core i5-661, a dual-core, 4-thread chip with a hearty clock speed of 3.33GHz and a 32nm process. The processor is packed with technologies from Intel, including Turbo Boost, which dynamically throttles the processor frequency depending on CPU demand—up to 3.6GHz in this case—and Hyper-Threading, Smart Cache (4MB shared), and an integrated memory controller, all designed in one way or another to enhance multitasking, data access, and memory performance.

Apparently not content to fit just the CPU and memory controller onto a single microprocessor, Intel has found a way to cram an IGP in there, too. The Core i5-661 (and all other Clarkdale processors) is equipped with a 900MHz Intel Graphics Media Accelerator HD 45nm chip. The

IGP features support for, among other things, HDMI, DisplayPort, DVI, VGA, and SDVO display outputs; dual simultaneous HDMI and audio streams; Full AVC, VC-1, and MPEG2 HW Decode; HDCP (full stream); and Dolby TrueHD and DTS-HD Master Audio.

For all the ingenuity and intriguing potentialities inherent in this fusion, the GMA chip presently leaves something to be desired performance-wise. For example, although it supports DirectX 10 and 3D gaming, you won't see playable frame rates in anything more intense than a mainstream game. (To be fair, Intel doesn't claim that it can.)

When paired with the Intel DH55TC motherboard, the Core i5-661 provides the backbone for a solidly performing mainstream platform—especially if

that motherboard is equipped with a decent graphics card to deliver a better gaming experience. ▲

by Seth Colaner

Core i5-661

\$196

Intel

www.intel.com



Intel Core i5-661 & Intel DH55TC*

Benchmark Results*

3DMark Vantage

Overall	P14347 (E5266)
GPU	16746 (4612)
GPU Test 1	52.55 (14.67)
GPU Test 2	45.44 (12.3)
CPU	10034 (9163)
CPU Test 1	1371.12 (1251)
CPU Test 2	13.74 (12.57)

PCMark Vantage Pro

Overall	4521
Memories	3800
TV And Movies	3399
Gaming	5639
Music	4206
Communications	4165
Productivity	4184
HDD	2124

Dr. DivX 2.0.1** 4:35

POV-Ray 3.7*** 1686.3pps

WinRAR 3.71** 2:24

Cinebench 10

Multithreaded (min:sec)	1:39
Multithreaded (score)	8878

Far Cry 2

Ultra High quality, No AA 78.35 (5.7****)

*IGP-only results in parentheses.

**minutes:seconds

***pixels per second

****Tested at Very High quality, no AA
Far Cry 2 tested at 1,280 x 1024.

Specs: Socket LGA-1156; Core clock: 3.33GHz; 4MB shared L3 cache; 32nm process

Test system specs: RAM: 2GB OCZ DDR3-1333; Graphics: ATI 5870; Hard Drive: 80GB Maxtor DiamondMax Plus 9

Intel DH55TC Media Series

As Intel increasingly moves important pieces of computer technology from the motherboard to the CPU (integrated graphics is the latest to make the move), its boards, including the DH55TC Media series, are becoming less interesting. That's not to say the quality isn't there, but there's little about the DH55TC worth noting. It's the Sarah, Plain And Tall of motherboards.

The DH55TC is a Socket LGA-1156 motherboard and supports corresponding Core i5 and Core i7 processors. Equipped with the H55 Express chipset, the DH55TC features Identity Protect technology; Remote PC Assist technology (previously a feature available for IT users, Remote PC Assist lets you contact

Intel tech support even when the operating system is down); and QST (Quiet System Technology), which is designed to regulate fan speed more efficiently.

Also included are a Gigabit Ethernet port; two eSATA ports; and a respectable number and variety of USB ports, video inputs, and PCI-E and PCI slots.

There's not a thing wrong with the DH55TC, and it's rather inexpensive to boot, but its most important role seems to be supporting all the technologies built into the CPU rather than boasting its own.

(Editor's note: For performance results, please refer to the chart above.) ▲

by Seth Colaner

Specs: Chipset: Intel H55; Socket LGA-1156; Ports: 1 Gigabit Ethernet, 6 SATA 3Gbps (including 2 onboard eSATA), 12 USB 2.0, VGA, DVI-D, HDMI; Slots: 1 PCI-E 2.0 x16, 2 PCI-E x1, 1 PCI

Test system specs: RAM: 2GB OCZ DDR3-1333; Graphics: AMD ATI Radeon HD 5870; Hard Drive: 80GB Maxtor DiamondMax Plus 9

DH55TC

\$100

Intel

www.intel.com



Noctua NH-U12P SE2

Priced at \$65, Noctua's NH-U12P SE2 needs to add significant value to an overclocking attempt to justify its high-end cost. Or does it? The NH-U12P SE2's tower design looks a lot like Thermalright's revered Ultra-120 eXtreme, which costs \$60 with no fan. And although Thermalright's offering is a little heavier, both heatsinks employ four heatpipes that run through their bases up into aluminum fin arrays. The NH-U12P SE2 is wider and adds support for LGA-1156 sockets. Best of all, the NH-U12P SE2 includes two 120mm NF-P12 fans, plus a pair of adapters per fan you can use to balance noise and cooling capacity.

Compared to the Ultra-120 eXtreme, the NH-U12P is a little bit wider at some points and narrower at others. Depending

on spacing between your CPU socket and memory slots, installing both of the heatsink's fans could block slots populated by tall modules, such as Corsair's Dominator kits. To its credit, Noctua maintains an impressively up-to-date compatibility list on its Web site.

Using a Core i7-975 Extreme overclocked to 4GHz on an Asus Rampage II Extreme motherboard, we measured temperatures using Core Temp 0.99.5. At idle, the CPU's four cores averaged 39 degrees Celsius with Intel's reference cooler, 35 C using Thermalright's Ultra-120 eXtreme, and 34 C using Noctua's NH-U12P. With an eight-thread, 64-bit Prime95 workload



NH-U12P SE2

\$65

Noctua

www.noctua.at



running, the Intel stock cooler was no longer able to keep our 4GHz setup

stable. Thermalright's cooler crested at 80 C, while the NH-U12P ducked in at (a still hot) 78 C.

More important than the NH-U12P SE2's 2-degree victory is the fact that it's simply a more complete package. The cooler supports all modern socket interfaces and includes two 120mm fans, all at a price that's just slightly higher than Thermalright's celebrated enthusiast air cooler. ▲

by Paul Cross

Specs: Socket compatibility: LGA-1366/1156/775, Socket AM3/AM2+; Dimensions: 158 x 126 x 120mm (HxWxD); Weight: 940g (with fan); Materials: Copper base, aluminum fins; Fans: 2 120mm (1,300rpm)

Motorola Droid

It has been a checkered first year for Google Android, but we finally have in the Motorola Droid a super smartphone to join with the aforementioned OS to make a credible run against the Apple iPhone juggernaut. Part of Droid's strategy is to overwhelm the competition with superior hardware: a 3.7-inch, drop-dead gorgeous 480 x 854 display; a good 5MP camera with LED flash and very strong video recording; multitasking with a pop-up, task-switching window; built-in Google Talk; and turn-by-turn navigation.

For a longtime iPhone user like me, the Droid's specs impress at every turn. The extra resolution and screen real estate make Web browsing in landscape mode a pleasure; there really is that much more info on the screen. As we discovered with the Palm Pre, multitasking matters, and the Arm Cortex A8 550MHz processor handled it smoothly. Despite some questionable route

choices and an irritating voice, the onboard Google navigation system guided us to our destination. And both voice clarity and 3G data speeds on Verizon's unmatched CDMA 3G were simply more reliable and snappier in more places. Android OS 2.0 also has a good virtual keyboard and more integrated messaging that can converge email and contact data better now.

That said, the Droid has its flaws. The flip-down keyboard is rendered useless by error-prone flat keys, making the phone a heavy, sharp-edged brick. The absence of multitouch on U.S. models seriously undermines map and Web browsing. We had to tweak the settings to get a full workday of voice and data use between

Droid

\$559.99

Motorola

www.motorola.com



charges, but your mileage may vary. And the Android Market is still cluttered with a lot of poorly organized junk apps. In terms of sheer consumer friendliness, this is no iPhone.

And yet, Droid shows off the best of Android: good onboard searching and Google services integration, superb Web browsing (especially on Verizon's network), a promising app platform, and a real PC-like mobile experience.

Good robot! ▲

by Steve Smith

Specs: 3.7-inch WVGA screen (480 x 854); Dimensions: 2.4 x 4.6 x 0.5 inches (HxWxD); 802.11b/g; Weight: 6oz.

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

msi™



SUPPORTS THE ALL NEW 2010 INTEL® CORE™
PROCESSORS IN THE LGA1156 PACKAGE



BIG BANG FUZION

EVENT.MSI.COM/MB/BIGBANG

MSI's new Big Bang Fuzion gaming motherboard is built for the serious gamer—exclusive Hydra technology, a suite of audio enhancements, and constructed to withstand extreme operation.

With the Intel LGA1156 socket, the Big Bang Fuzion supports Intel Core i5 and Core i7 processors and up to 16GB of DDR3-2133 (up to four DIMMs). It also sports three PCI-E x16 slots, two PCI-E x1 slots, and 2 PCI slots; 10 SATA (3.0Gbps) ports; two Power eSATA ports; 14 USB 2.0 ports; two IEEE 1394 ports; and legacy support for one PATA IDE device. All of this in addition to the included 7.1-channel Quantum Wave audio card.

Performance

Breakthrough Hydra technology allows you to mix-and-match your choice of video cards and boosts your performance for a truly unlimited gaming experience.

And thank to MSI's OC Dashboard, the Fuzion comes with all the overclocking tools you need. The OC Dashboard lets you overclock your system without booting into the BIOS—you don't even need to interrupt your game to do it. Fuzion's OC Genie feature lets you overclock almost instantly with push-button ease. If you like to keep a keen eye on your system when overclocking, the V Kit feature lets you monitor the motherboard's voltage under intense conditions.

Audio

The Big Bang Fuzion's audio experience is driven by the built-in Quantum Wave audio card, which contains powerful audio-enhancing technologies, including THX TruStudio PC suite and Creative EAX 5.0.

The THX TruStudio PC suite supports Blu-ray playback and stabilizes volume levels. Additionally, the technology

enhances audio content, including stereo audio (to up to seven channels) and compressed audio. Creative's EAX (Environmental Audio eXtensions) 5.0 is designed to enhance the detail of the audio and provide a more cinematic experience when gaming. The Quantum Wave audio card also supports the True 24 bit/192kHz HD Audio Codec, which delivers dynamic audio to the Blu-ray experience.

Stability

Built for intensive use, the Big Bang Fuzion board features a 100% server-grade Hi-c Cap for higher thermal stability and more efficient energy use, which is further helped by DrMOS, SuperPipe, and SFC (Super Ferrite Choke) technology, which enhance power efficiency, cooling, and stability, respectively. ▲

Mountain Mods Pinnacle 24

In the February 2009 issue (see page 28), Mountain Mods made an impression with its massive Ascension CYO (Choose Your Own) computer case, which you could order with your choice of panels, window designs, personalized etchings, and fan configurations.

Mountain Mods' latest offering, the Pinnacle 24 CYO, is not quite as physically imposing as last year's, but it takes the firm's hyper modular philosophy to new heights thanks to the Flash-based CYO Picker, which lets you go online and choose from multiple side, front, back, and top panels; a half-dozen acrylic window finishes; a handful of case finishes and paint options; and a number of etchings. To check it out for yourself, visit www.mountainmods.com/CYO_picker.php.

click a model, and then start checking boxes to visualize your ultimate case.

The Pinnacle 24 we created has an anodized black aluminum finish, a neon orange side-panel window, and the compulsory *CPU Magazine* etching. We ordered our Pinnacle 24 with an XL-ATX motherboard tray, so we could turn this system into our 4-way SLI/CrossFire beast.

Assembly was fairly intuitive, which is good because the generic assembly instructions failed to point out the pitfalls specific to our Pinnacle 24. Case in point, we installed the front and back panels on the wrong sides of the bottom panel but only discovered our error when we tried to secure the motherboard tray with the corresponding bracket. Total lost time: about five minutes.



Pinnacle 24 CYO

\$279.99; (\$414.98 as shown)

Mountain Mods

www.mountainmods.com



Specs: Dimensions: 24 x 24 x 9 inches (HxWxD); Material: Aluminum; Form factors: up to XL-ATX; Bays: 3 5.25-inch, 3 3.5-inch

But the positives of interchangeable parts that you can swap and rotate at will far outweigh these minor gripes. Maybe it's our latent love for all things Lego, but we have to admit we thoroughly loved building our Pinnacle 24. If you're looking for the ultimate in DIY modularity and customizability, look no further than Mountain Mods' CYO line of cases and the Pinnacle 24. ▲

by Andrew Leibman

BFG Deimos X-10

BFG's first notebook is a real whopper. The Deimos X-10 is an 18.4-inch (1,920 x 1,080 resolution) notebook that features two Nvidia GeForce GTX 280Ms in SLI, 8GB of DDR3-1066MHz memory, and an Intel Core 2 Extreme QX9300 processor.

BFG uses Clevo's M980U case, which offers pretty much every input and output we can think of, including a coaxial input for TV, IR port for compatibility with remote controls (though none was included), and an HDMI output. The mirror-like gloss on the screen, bezel, and case were a bit too reflective for my tastes, but the glossy screen looked great in a dark room. Similarly, the touch-sensing keys were attractive but took a couple of seconds to respond, which was annoying over time. On the interior, BFG outfitted our Deimos with two 500GB, 7,200rpm drives set up in RAID 0; a Blu-ray player/DVD burner; and a fingerprint reader.

Performance-wise, the Deimos blew us away. It produced 44.13fps in Far Cry 2 with 8X antialiasing at 1,920 x 1,080. The Deimos delivered an overall score of 10,103 in 3DMark Vantage, with nearly equal scores in the GPU (9985) and CPU



Deimos X-10

\$4,423 (as tested)

BFG Tech

www.bfgsystems.com



Specs: CPU: Intel Core 2 Extreme QX9300 @ 2.53GHz; GPU: Nvidia GeForce GTX 280M GDDR3 (2x, SLI); RAM: 8GB DDR3-1066; Storage: 500GB Seagate Momentus (2x; RAID 0); OS: Windows 7 Ultimate 64-bit

(10249) tests. Note that the Deimos' AC adapter is all but mandatory; in our BD time test, the system could only survive off of its battery for 62 minutes.

BFG offers a number of configurations for the Deimos with prices starting at \$1,859. And if you're looking for a DTR that will still impress at a LAN party, the Deimos may be the perfect fit, assuming also you're willing to carry it around. ▲

by Nathan Lake

Benchmark Results

BFG
Deimos
X-10

3DMark Vantage

Overall	10103
GPU Score	9985
GPU1 (fps)	29.89
GPU2 (fps)	29.75
CPU Score	10249
CPU1 (Plans/s)	1372.58
CPU2 (Steps/s)	14.05

PCMark Vantage Pro 1.0

Overall	6229
Memories	4816
TV And Movies	4221
Gaming	5338
Music	5256
Communications	5516
Productivity	5843
HDD	4101

SiSoft Sandra 2010 Lite

Processor Arithmetic

Dhrystone ALU (GIPS)	50.7
Whetstone iSSE3 (GFLOPS)	34.1

Processor Multi-Media

Integer x16 iSSE4.2 (Mpixels/s)	126.82
Floating Point x8 iSSE3 (Mpixels/s)	80.14
Double x4 iSSE2 (Mpixels/s)	42.14

Memory Bandwidth

Integer Buffered iSSE2 (GBps)	5.90
Floating-Point Buffered iSSE2 (GBps)	5.88

Crysis 1.1 (no AA) 45.53

FarCry 2 (8XAA) 44.13

Games tested at 1,920 x 1,080.

TrickleStar PC TrickleSaver

I have four kids who seemingly can't turn off a computer and its attached peripherals upon finishing unless there's an exchange of gold bullion promised. Enter the PC TrickleSaver, a simple-as-pie way to cut vampire power to peripherals and ultimately save some cash. After all, TrickleStar proclaims that standby power can total as much as 12% of our electricity bill, and standby power that consumers and businesses waste totals roughly \$4 billion yearly.

Using the TrickleSaver involves plugging it into a power outlet and attaching its integrated USB connector to a USB port (not a hub) on your PC, which should use its own outlet. The peripherals must plug into a separate power strip, which connects to the TrickleStar's female power socket. (TrickleStar sells versions for North America and several other countries.) That's it. Now, when the TrickleStar's USB connector senses the computer is off, it powers off the peripherals' power strip.

To power off peripherals while the system is still running, TrickleStar offers the TrickleSwitch (\$9.95), which is essentially a manual button.

Note that PCs configured to sleep or hibernate won't work. Also, some users have reported that certain motherboards (Gigabyte's in particular) continue to power USB ports even after shutdown, also quashing TrickleSaver's effectiveness. I connected the TrickleStar to several systems, including a Windows XP system with a printer, cable modem, Web cam, router, scanner, subwoofer, and speakers all attached and drawing power from a separate power strip. The TrickleStar worked as advertised on each, turning off the peripherals within seconds of shutdown and

PC TrickleSaver
\$16.95
TrickleStar
www.tricklstar.com



Specs: Wall- and desk-mountable; PC- and Mac-compatible; Dimensions: 1.33 x 2.36 x 4.41 inches (HxWxD)



restarting the peripherals as I left them upon powering back up.

TrickleStar offers an online Standby Power Calculator (calculator.tricklstar.com) to help determine your standby energy usage, how many CO₂ emissions you could save, and how long it will take for the TrickleSaver to pay for itself. The company's TV TrickleSaver (\$19.95), meanwhile, takes the same approach toward gaming consoles, Blu-ray/DVD players, and other accessories attached to a TV. ▲

by Blaine Flamig

Zalman CNPS10X Quiet

When it comes to cooling, most of the heatsinks we test aim for a balance between thermal performance and cost. Acoustics are, of course, another factor, but it's rare to see a performance cooler that tackles noise up front. Yet, if we were going to get an aurally-optimized heatsink-and-fan combo from anywhere, it'd be from Zalman.

The CNPS10X Quiet belongs to a family of new models that also includes the CNPS10X Flex (supporting two fans) and CNPS10X Extreme (an emphasis on raw performance)—all 120mm towers from a company known for its cylindrical designs, able to consistently perform well while using large, slowly spinning fans to cut back on noise.

The evolutionary shift treats Zalman well. Its CNPS10X Quiet is able to handle all relevant socket interfaces. We were

pleased to find that the included backplates simplified the mounting process. Installation on an AMD-based motherboard is even easier thanks to a pair of snap-on clips.

As with most other 120mm tower-style coolers, the CNPS10X Quiet is both tall and wide, so it has the potential to block memory slots on some motherboards. With that said, we didn't have any trouble on Asus' Maximus III Formula or Intel's DP55KG.

The CNPS10X Quiet's performance can be dialed in using Zalman's bundled Fan Mate 2 controller—a potentiometer used to vary fan speed from 700 to



CNPS10X Quiet
\$60
Zalman
www.zalman.com



1,400rpm. At the lowest setting, you really strain to hear the fan (especially with a Radeon HD 5850 in the machine).

The graphics card remains noisy even at the fan's maximum speed, which is where we did our testing. Using Core Temp 0.99.5 to measure the heat output of our Core i7-975 Extreme overclocked to 4GHz, we recorded idle temperatures of 36 degrees Celsius and load temps of 81 C (just slightly warmer than our reference Thermalright Ultra-120 eXtreme).

Overall, Zalman's CNPS10X Quiet strikes a great balance between cooling capacity and acoustics. ▲

by Paul Cross

Specs: Socket compatibility: LGA-1366/1156/775, AM3/AM2+/AM2/939; Mass: 750g; Materials: Aluminum/copper base, aluminum fins; Five heatpipes; Fans: 1 120mm, up to 1,500rpm (with direct motherboard connection)

Corsair Dominator GTX DDR3-2250 6GB

As a general rule, there are two variables that affect the performance of your memory subsystem: transfer rate and latency. For example, when you buy a Core i7-920, which officially supports up to DDR3-1066 memory, you can accept that relatively low speed to stay within spec and buy modules with aggressive timings. Otherwise, you must crank up the data rate, incurring higher latency as you go faster.

Corsair's new Dominator GTX modules push the envelope from both directions, promising transfer rates up to DDR3-2250 with timings as low as 8-8-8-24. If those sound like insanely aggressive specs, it's because they truly are. In fact, 2,250MTps is more than two times faster than the speeds that Intel's Core i7-900-series' rated spec and frankly a difficult target to hit for

all but the most experienced overclocking enthusiasts.

Knowing that we might not be able to push these modules to their limit, even with the best hardware in the lab, we loaded up an Asus Rampage II Extreme with Intel's Core i7-975 Extreme processor and capped it off with Thermalright's Ultra-120 eXtreme cooler. The Asus board offers a number of memory ratios that make it possible to hit incredibly high transfer rates. The real challenge is dialing in voltage levels to push the Core i7's memory controller hard enough to maintain such crazy speeds.

We settled on 1.4V CPU, 1.5V uncore, and 1.65V DRAM voltages—enough to hold a DDR3-

2133 transfer rate at 8-8-8-24. The result was 30.6GBps in SiSoftware's Sandra 2010 Int Buff'd iSSE2 test and 30.7GBps in the Float Buff'd iSSE2 test.

In short, Corsair's new DDR3-2250 Dominator GTX kit gives the upper echelon of overclockers plenty of room to explore outrageous BCLK settings, but it's definitely overkill for most other enthusiasts, especially at \$200 per 2GB module. ▲

by Paul Cross

Corsair Dominator GTX DDR3-2250 6GB

\$600
Corsair
www.corsair.com
●●●●●



Specs: Capacity: 6GB; Rated speed, timings (Intel X58, P55 Express): DDR3-2250, 8-8-8-24; Rated speed, timings (AMD Socket 3): DDR3-1800, 6-6-6-18; Voltage: 1.65V

Plaster Networks PLN3

Imagine you're in a lecture hall, trying to listen to someone speak on stage. Two people are whispering next to you. The guy on stage can't hear the whisperers at all, but because you're so close to them, they're making it very hard for you to hear the lecturer. This is essentially how device noise affects powerline adapters, notorious for their shoddy performance over distance.

Plaster Networks isn't so concerned with raising the ceiling of HomePlug AV networking performance as it is with raising the floor. The company's idea is to use better noise filtering and signal control technology for better throughput.

We tested two PLN3 adapters, one connected to our Gigabit switch and the other to a 100Mbps-equipped netbook at the opposite end of a 2,400-square foot house. Without a single button press, the two paired and worked instantly. For our test, we upped the difficulty by plugging the



PLN3
\$149.95 (kit of two)
Plaster Networks
www.plasternetworks.com
●●●●●

netbook's powerline adapter into a power strip that had three things already plugged in (the netbook's AC adapter, a Linksys access point, and a lamp).

As a reference, we copied a 2GB file collection from a Gigabit NAS box

attached to the switch Cat 5e in 3:53 (68.67Mbps). We knew the netbook's outlet was at the far range of many powerline adapters, with most hitting under 10Mbps on this test. The PLN3 kit managed the transfer at 19.48Mbps, which is a minor miracle.

We then plugged the strip into Plaster's IX2 Isolator (\$24.95), which is designed to filter noise from attached devices in the 2 to 30MHz range used by HomePlug devices. We ran the transfer again and copied the file at a swift 25.72Mbps—a nearly 25% gain just from using the IX2 on the same outlet.

At service.plasternetworks.com, you can sign up for a free 12-month subscription that will track the bandwidth of your PLN3 connections. With this, you can set up bandwidth alerts and monitor your performance history. If you need powerline networking, Plaster's PLN3 and IX2 is the best powerline combo we've seen yet. ▲

by William Van Winkle

Specs: Dual 100Mbps Ethernet ports; 128-bit AES encryption; PHY rate: up to 200Mbps

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Ultra Products Ultra X4 850W

A few months back, we took a look at the first product from Ultra's brand-new line of X4 power supplies to hit the test bench, the Ultra X4 1050W. (See the November 2009 issue.) Overall, we liked the 1050W unit, but since that time, the X4 product line has been fleshed out with a number of other power supplies.

About in the middle of the pack lies the Ultra X4 850W. Like the other members of the X4 family, this 850W PSU is completely modular, including the 24-pin ATX power cable and 4- and 8-pin motherboard power cables. A single 135mm fan that's mounted to the bottom of the unit handles the PSU's cooling; considering the X4 850W's high output, the fan was relatively quiet.

The Ultra X4 850W features a single 12V-rail with a peak 60A output rating for compatibility with a broad range of hardware.

Ultra X4 850W

\$249.99

Ultra Products

www.ultraproducts.com



We tested the Ultra X4 850W on an 8-core Intel Skulltrail rig, complete with multiple drives and a pair of AMD's recently released ATI Radeon HD 5970 cards. Despite peak power consumption over 760W and a continuous load around 746W, the X4 850W never exhibited any instability.

Users shopping for a modular PSU in the 850-watt range should certainly consider this PSU. Its price is slightly higher than some other, similarly powered units, but the fully modular cables and lifetime warranty are quite appealing. ▲

by Marco Chiappetta



Ultra X4 850W Specs

Rated continuous (W)	850W
Rated peak (W)	850W
12V rails	1
+12V continuous (A)	60
+5V continuous (A)	30
+3.3V continuous (A)	24
SLI-certified	Yes
CrossFire-certified	Yes
Max Wattage Tested	746W
Case Temp as Tested	61 C
Power Factor as Tested	0.99
Efficiency rating (as advertised)	80+ Silver-certified (88% Typical Load)
Modular cables	Yes
Cable side	Motherboard
Fan location	Bottom
Fans	1x 135mm
PCI-E 8-Pin	3 (6+2)
PCI-E 6-Pin	6
Main 12V	24-Pin
8-Pin EPS12V	1
4-Pin 12V	1
SATA	11
Molex 4-Pin peripheral	9
Floppy 4-Pin	2
Finish	Matte black
Length Including	
Cable Bend (in inches)	6.5
Warranty	Lifetime

Kingston SSDNow SNV125-S2BD/40GB

Kingston is taking an interesting approach with the release of its SSDNow V-Series SNV125-S2BD/40GB. Kingston contends—and we'd have to agree—that SSDs are considered a performance and not necessarily storage upgrade by many PC enthusiasts. Many power users are pairing an SSD to a traditional hard drive with the goal of achieving increased performance, not greater storage capacity. As such, the SNV125-S2BD/40GB is designed to replace a boot drive. Kingston doesn't expect this drive to hold more than the OS and perhaps the user's most commonly used applications; it needs a larger capacity bulk storage drive as a complement.

Instead of offering a high-capacity SSD as part of the kit, Kingston went with an Intel-built, but Kingston-branded, low-capacity 40GB SSD. The drive is essentially a pared-down X25-M, with only five flash chips inside. Other than the drive itself, the



SSDNow SNV125-S2BD/40GB

\$130

Kingston

www.kingston.com



10-channel controller, but performance was still quite good.

If you haven't experienced the benefits of an ultra-low-latency SSD as your OS/application volume, we highly recommend it. With its relatively low price and included migration tools, the Kingston 40GB SSDNow V-Series might be all the motivation you'll need. ▲

SNV125-S2BD/40GB kit includes a 4-pin Molex-to-SATA power adapter, SATA cable, and a disc complete with drive cloning software to facilitate migration from one drive to another.

With the five flash chips, it doesn't quite perform as well as higher capacity Intel SSDs that can better exploit the capabilities of Intel's

by Marco Chiappetta

Benchmark Numbers

HD Tach

Average read	178.4MBps
Average write	46.5MBps
Burst speed	3.9GBps
Random access	.1ms
CPU utilization	1%

ATTO Disk Benchmark

4K transfers (read/write)	183MBps/45MBps
64K transfers (read/write)	195MBps/45MBps
8MB transfers (read/write)	199MBps/45MBps

Specs: Capacity: 40GB; Interface: 3Gbps SATA; NAND type: MLC; Controller Type: Intel; Form factor: 2.5-inch; 1,000,000-hour MTBF

by Anand Lal Shimpi

Pine Trail: Pushing Us Back Into The Arms Of Nvidia

The problem with chip design is that it's nearly impossible to be reactionary to the moves of your competitors in real time. Even the simplest designs take at least six months from inception to production, and full-blown desktop and mobile processors take years. Even seemingly minor changes can take a good 12 months. Doing things quicker than that is possible (within reason), it just costs a lot more.

I suspect that's part of the problem behind the lackluster reception of Intel's second-generation Atom chip, code-named Pine Trail.

Nvidia did a very smart thing with Ion. By enabling H.264 video acceleration in a chipset designed to be paired with Intel's Atom processor, at first all it enabled was Blu-ray playback on really slow PCs. A nice feature, but not really necessary. After all, most capable desktop PCs can't even play Blu-rays. The demand just isn't there.

Adobe's recent release of the Flash 10.1 beta changed everything, though. An Ion-equipped Atom netbook or net-top can now play Blu-ray movies, as well as full-screen Flash video, regardless of desktop resolution. Thanks to Nvidia and Adobe, Atom can be used as a very cheap, very low-power home-theater or living room PC.

It's a totally realistic and valid usage scenario. I do nearly all of my "TV watching" online. An Ion PC could easily be my cable box replacement. All I'm really missing is a good way of getting all of the content I want in one easily accessible place. Hulu is good, but it's not all encompassing, nor does it act as a good repository for older episodes. If the content providers want to curb piracy, we need a better alternative to Hulu. It's only a matter of time, but I digress.

It's because of Ion's usefulness in this regard that I was surprised to find out Intel's Pine Trail doesn't include any H.264 decode acceleration. In fact, the only way to get H.264 decode support on Pine Trail from Intel is to use a third-party video decoder from a company like Broadcom. Unfortunately, those third-party decoders aren't being used on initial Pine Trail designs and,

from what I hear, they can't be used to accelerate Flash video, either. It's a lame solution unless someone can prove otherwise.

I suppose it's an issue of the Pine Trail design being relatively final long before Ion ever took off, and later Intel apparently didn't deem it necessary to spend the required funds to change it. Pine Trail is interesting from a performance and even more so from a power consumption standpoint, but the response of most I've talked to hasn't been that great thus far.

Which pushes us back into the arms of Nvidia. Ion 2 is coming. Like the original, it's basically a repurposed chipset, but in this case it should be devoid of most of the chipset-like features. Nvidia doesn't have a DMI license, and that's the only way to talk to the new Atom CPU. Ion 2 must instead connect via PCI Express to Pine Trail's NM10 chipset . . . much like a discrete GPU would.

Still, there's a lot that can be done over PCI-E. All of the GPU-ness of Ion works over that, as does the H.264 decode acceleration and audio processing.

In short, it looks like Ion is going to build off of the success of the first product and will be around in 2010, even on Pine Trail. The only question that remains is how much will it cost. ▲



Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, CBS' "48 Hours," and Fortune. His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.

Talk back to Anand at anand@cpumag.com

**Thanks to Nvidia
and Adobe,
Atom can be used as a
very cheap,
very low-power
home-theater
or living room PC.**



Connect. Share. Play.



Valkyrie

Box Office

Gear Box

When it comes to digital living, Patriot has the solutions for you. From our Box Office all-in-one digital media player to our Valkyrie & Gear Box NAS solutions, sharing digital content like movies, music and photos is a snap.



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Canada Computers
www.canadacomputers.com

TigerDirect.com

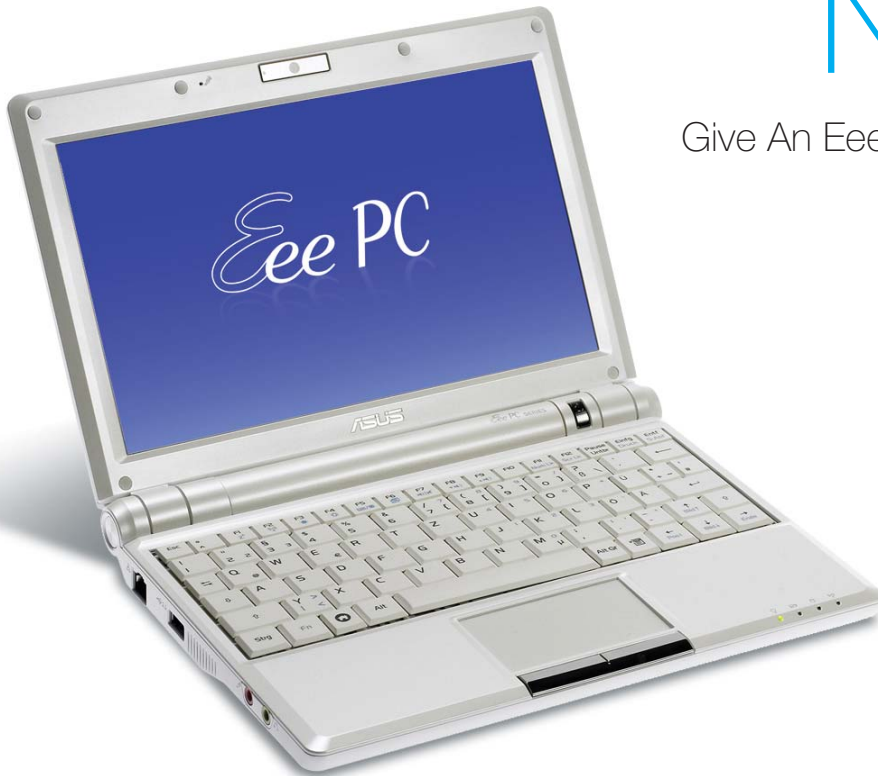
COMPUSA.com

MICRO CENTER
computers & electronics

www.patriotmemory.com

Rehab A First-Gen Netbook

Give An Eee PC A New Lease On Life



The Asus Eee PC 900 was one of the first widely adopted netbooks. It featured an 8.9-inch screen, Windows XP or Linux, and mobile Intel Celeron processor.

Although it was not the first company to release an ultra small notebook, Asus was the first to market an affordable, fully functional, yet low-powered, notebook that caught on with a large number of PC users. We could argue that other companies were responsible for the term “netbook” and that Asus’ timing just happened to be right; regardless, it’s safe to say that Asus is largely responsible for the current netbook craze. It started a couple of years ago with the introduction of the first Eee PC, and demand for the diminutive machines hasn’t quelled since.

The first few waves of netbooks were enormously popular and sold very well. Today’s netbooks, though, are far more

refined than their predecessors. Those early machines feel sluggish and severely underpowered in comparison, despite the fact that the platforms they were based on aren’t really all that much slower in real-world situations.

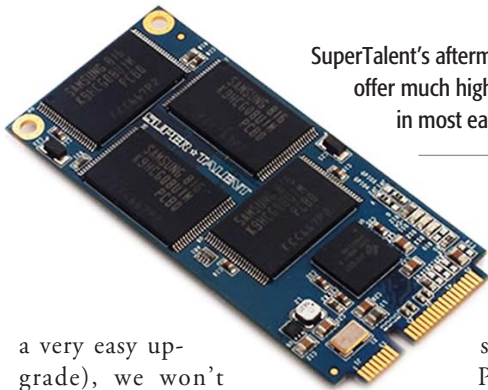
One of the more popular early netbooks was the Asus Eee PC 900. It featured a 900MHz Mobile Celeron processor, an Intel 915 chipset with integrated graphics, 1GB of RAM, and a funky storage subsystem that consisted of a relatively speedy 4GB flash drive for the OS volume and either an 8, 12, or 16GB secondary mini PCI-E SSD for additional storage depending on the included OS. The secondary SSD, however, was pretty slow (slower than most HDDs) and not adequate for hosting an OS.

Fast forward to today, and most netbooks are built around Intel’s Atom processor and mobile 945 chipset. They feature standard 1.8- or 2.5-inch hard drives and ship with Microsoft’s more streamlined and netbook-friendly Windows 7. All of that adds up to a superior experience.

Without some serious shoehorning, we can’t make a hard drive fit in an Eee PC 900, and 4GB isn’t enough space to install Win7 on the faster internal flash drive. But we want to help all of you early adopters out there to alleviate your netbook envy. There’s still plenty we can do to rejuvenate an older netbook to make it perform much better, and it’s possible to put Win7 on the machines, too. We’ll use an Eee PC 900 for our project, but there’s no reason you can’t do the same things with any of the other early netbooks that don’t quite stack up to today’s offerings in their stock form.

The Mods

To mod our Eee PC 900, we’re going to replace its slow mini PCI-E SSD with a much faster drive and install Win7 on the machine using a USB flash drive. We should note that we upgraded this particular netbook to 2GB of RAM long ago, but because many early netbook owners did the same (and because, let’s face it, it’s



SuperTalent's aftermarket mini PCI-E MLC- or SLC-based SSDs offer much higher performance than the stock SSDs included in most early netbooks.

a very easy up-grade), we won't cover that in this article.

A number of companies such as RiData, OCZ, Patriot, and Super Talent have released fast, mini PCI-E SSDs that are plug-in compatible with most early netbooks. Prices on these drives range from \$49 for a basic 16GB model to over \$200 for a high-performance 64GB model. For this mod, we got our hands on a fast 32GB MLC-based drive from Super Talent (model FPM32GLSE) that offers transfer speeds over 90MBps, but any mini PCI-E SSD will do. (Note that some netbooks require IDE Zif or half mini PCI-E drives, but those are available online, as well.)

Installing Win7 from a USB flash drive takes a bit of work and will require a drive with at least a 4GB capacity. A number of steps are required to prepare the USB flash drive for use, and we'll need to copy the Win7 installer files to the drive, too. But we're getting ahead of ourselves.

Prep The Flash Drive

The first thing required to install Win7 on a netbook (without using an external optical drive) is to prepare the flash drive using the DiskPart utility included with Windows Vista and Win7. To prepare the flash drive, you'll need to use a Vista- or Win7-based PC (WinXP will not work using the steps outlined here) that's equipped with an optical drive. Technically, the optical drive isn't a necessity unless you have Win7 on DVD only, because the files can also be pulled from an ISO image. We'll be using a full retail version of the OS and will outline the steps assuming you have an installation DVD, too.

First, launch a command prompt as an administrator by clicking the Start Orb, and then go to All Programs and Accessories. In the Accessories group, right-click Command Prompt and choose Run As Administrator from the menu; a command prompt window will open. At the prompt, type **diskpart** and press ENTER to launch the utility. You'll be greeted by a simple prompt labeled DISKPART>.

At the DISKPART> prompt, type **list disk** and press ENTER to bring up a list of drives connected to the system. In the Disk ### column, you'll see that numbers are assigned to each drive. In our test machine, the USB flash drive we wanted to use for this project was labeled Disk 3, but your drive may be different. Be sure to write down and reference the correct number for the flash drive you're using to prevent unwanted repartitioning of another drive in your system. Once you know the number assigned to the drive, it must be selected in the DiskPart utility. Select the drive by typing **select disk 3** (substitute the 3 with the number of your drive) and pressing ENTER. A notice will scroll by saying the drive has been selected.

The next step is to clean the drive and wipe out any partitions that may reside on it. To do this, type **clean** at the prompt and press ENTER. Once DiskPart says the drive has been cleaned, a new partition can then be created. Create the new partition by typing **create partition primary** at the prompt and press ENTER. Next, the newly created partition must be selected in the DiskPart utility. Because the drive was cleaned, we know there is only a single partition on it; it should be labeled partition 1 (if you create multiple partitions on the drive, you can type **list partition** to see a list of partitions on the drive). Type **select partition 1** at this point and press ENTER. Next, type **active** at the

prompt to mark the partition, and thus the drive itself, as active—i.e. bootable—and press ENTER again.

With the USB flash drive cleaned, repartitioned, and activated, it's ready to be formatted. For the purposes of this project, you should format the drives with the FAT32 filesystem. To format the USB flash drive with FAT32, type **format fs=fat32** and press ENTER. Depending on the size of your flash drive, this process will take anywhere from a few minutes to a half an hour. When the formatting process is complete, the final necessary

```

Administrator: Command Prompt - diskpart
Microsoft Windows [Version 6.0.6002]
Copyright (c) 2006 Microsoft Corporation. All rights reserved.

C:\Windows\system32\diskpart

Microsoft DiskPart version 6.0.6002
Copyright (c) 1999-2007 Microsoft Corporation.
On computer: USTB-GLIM016

DISKPART> list disk

Disk ### Status Size Free Dyn Gpt
Disk 0 Online 1397 GB 0 B
Disk 1 Online 699 GB 0 B
Disk 2 Online 7648 MB 0 B
Disk 3 Online 7648 MB 0 B

DISKPART> list disk

Disk ### Status Size Free Dyn Gpt
Disk 0 Online 1397 GB 0 B
Disk 1 Online 699 GB 0 B
Disk 2 Online 7648 MB 0 B
Disk 3 Online 7648 MB 0 B

DISKPART> list disk

Disk ### Status Size Free Dyn Gpt
Disk 0 Online 1397 GB 0 B
Disk 1 Online 699 GB 0 B
Disk 2 Online 7648 MB 0 B
Disk 3 Online 7648 MB 0 B

DISKPART> select disk 3
Disk 3 is now the selected disk.

DISKPART> clean
DiskPart succeeded in cleaning the disk.

DISKPART> create partition primary
DiskPart succeeded in creating the specified partition.

DISKPART> list partition

Partition ### Type Size Offset
-----
Partition 1 Primary 7647 MB 1824 KB

DISKPART> select partition 1
Partition 1 is now the selected partition.

DISKPART> active
DiskPart marked the current partition as active.

DISKPART> format fs=fat32
100 percent completed
DiskPart successfully formatted the volume.

DISKPART> assign
DiskPart successfully assigned the drive letter or mount point.

DISKPART> exit
  
```

The DiskPart utility included with Windows Vista or Windows 7 can be used to create a bootable USB flash drive, suitable for installing Windows 7 on a netbook (or any other system for that matter).

step to prepare the drive is to assign a drive letter or mount point to the volume. Simply type **assign** at the prompt and press ENTER. Finally, type **exit** at the prompt and close the utility.

With a prepped flash drive at the ready, it's time to copy some files. As you might guess, you can't simply drag and drop the files from the Win7 installation disc to the USB flash drive. Instead, you must use the xcopy utility along with a

few parameters. Assuming your optical drive is drive E: and the USB flash drive is drive F:, the command necessary to copy the Windows installation files over is: `xcopy e:\*.* /s /e /f f:\`. The wildcards tell xcopy to copy all files and the /s and /e parameters tell xcopy to copy all directories and subdirectories, including empty ones. The /f parameter results in the full source and destination file names being displayed while copying. The copy process will take a good half-hour or so depending on the speed of your optical and flash drives. When done, the flash drive can be used to install Win7 on any machine that will boot to a removable USB device.

Dig Into The Netbook

With the flash drive prepped and ready to go, it's time to get the netbook upgraded. Before replacing any hardware or installing Win7, though, we'd recommend upgrading the netbook's BIOS as a precaution, as well as downloading any necessary drivers. For the Eee PC 900 we used for this project, the only driver we had to download was for ACPI. Win7 included the rest.

Disappointingly, Asus doesn't have a Win7-specific driver posted on its site, but there are a number of modded drivers available that were created by members of the enthusiast community. You can download the driver we used from tinyurl.com/y9sgun7. If you have a different netbook, though, other drivers may be required.

After updating our system's BIOS and downloading the ACPI driver, we set out to replace its SSD. To remove the stock drive, we loosened a few screws on the underside of the netbook to remove an access panel. Underneath the panel, two more screws held the stock mini PCI-E SSD in place. We removed those screws and simply unplugged the SSD; it'll pop right out like a SODIMM. Then, we plugged the SuperTalent SSD into the slot, secured it in place with the stock screws, and reinstalled the access panel—ready to roll.

Once we had upgraded the SSD, we plugged our USB flash drive containing

Win7 into one of the Eee PC's ports, powered up the system, and entered the system BIOS. In the BIOS, we set the machine to its defaults and enabled all of its integrated peripherals to ensure they'd be detected during the Windows installation. Then, we set the machine to boot from the removable USB flash drive, saved the changes, and exited the BIOS.

Upon rebooting, the Win7 installation will begin. Follow the on-screen prompts and step through the installation, making sure to select the proper SSD for the install location. Once the installation has progressed to the point of the first reboot, either unplug the USB flash drive or re-enter the system BIOS to set the replacement SSD as the boot device. Otherwise the system will continually boot to the removable flash drive.

With the Win7 installation complete, we installed the ACPI driver and ran Windows Update to fully patch the system. In our case, the complete installation, including the swap file, consumed a mere 8GB of the new SSD.

Grand Finale

Replacing the SSD and installing Win7 on the Eee PC 900 proved to be quite an upgrade. According to the Windows Experience Index rating, the system doesn't rank very highly, but the speed of the aftermarket SSD in conjunction with the streamlined Windows 7 OS nevertheless transformed the machine. The combination of Win7 and the upgraded SSD resulted in noticeably faster application load times, quicker Web



Replacing the stock SSD in an early netbook is usually much like installing RAM. Remove a few screws on an access panel, open the machine, and then remove a couple more screws to disengage the stock SSD. Then, remove it, plug in the new SSD, secure it in place with the screws, and replace the access panel.

browsing (especially with multiple tabs open), and smoother multitasking, none of which were always possible with WinXP and the slower stock SSD. ▲

by Marco Chiappetta

Get informed answers to your advanced technical questions from CPU. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

“ Nvidia is
rumored to have
its next-generation
GF100 GPU ready
for action sometime
in Q1 2010. ”

Each month we dig deep into the CPU mailbag in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable? CPU's "Advanced Q&A Corner" is here for you.

Brett C. asked: I am a student living in off-campus housing, so needless to say I'm pretty broke! A couple of years ago, I inherited what I thought was a pretty nice computer. It has an Intel Pentium Extreme Edition 965 processor, an Abit AW9D-MAX 975X motherboard, 4GB of DDR2-1066 RAM, a Radeon X1950 XTX, a Seagate 7,200rpm 500GB hard drive, a 750W PSU, DVD burner, etc.—all stuffed into an Antec case. I use the system mostly for schoolwork, Web browsing, and watching movies, and the only games I really play are World of Warcraft and Team Fortress 2. I am thinking about giving Left 4 Dead 2 and Modern Warfare 2 a shot, though, because everyone is talking about them!

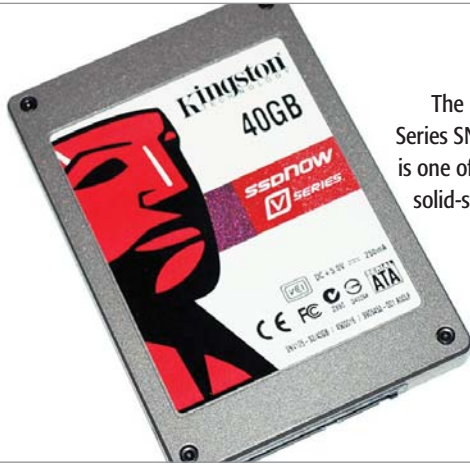
The problem is that my hard drive just bit the bust. I would like to fix my system on the cheap, but through school I found out I can get a copy of Windows 7 at a huge discount, so I'm thinking about just building a new system since I have to install my OS from scratch anyway. I used to run Vista; at times it really felt sluggish, but I'm not sure if that was Vista's fault or my hardware's. I'm writing to see if you'll talk me into upgrading (and eating nothing but ramen noodles for a few months!) or if you think my system is good enough as-is and I should just replace my hard drive.

A: Well, Brett, our inner enthusiast says upgrade to the fastest hardware you can afford, enjoy the newfound performance, and never look back, but our practical side thinks you have some pretty good hardware already at your disposal (so there's no need to deprive yourself of three square meals a day). Although the Pentium Extreme Edition 965 is undeniably slower than the high-end processors currently in Intel's and AMD's lineups, it's more than fast enough to handle the workloads you mention and will be fine running the games you currently play or want to play.

In addition, updates made to the thread scheduler and the core of Win7 itself make the OS much more capable of exploiting the Hyper-Threading feature in the Pentium Extreme Edition 965 CPU. Win7 won't make the 965 perform like a true quad-core, but its ability to more efficiently handle multithreaded workloads and manage them properly on logical processor cores will make better use of your processor's resources (not to mention the boost your system will realize from the myriad of other performance enhancements that come from Microsoft's latest OS).

With that said, spending a few bucks on upgrading just a few components in your rig will breathe new life into it and

make it perform exponentially better. If we were in your shoes, we'd pick up a fast, cheap hard drive for bulk storage, a new video card that offers HD video acceleration, and a cheap SSD for your OS drive. That may sound like a lot, but you could easily gather all of these things up for around \$350. Not exactly chump change, but it's a heck of a lot less money than you'd have to spend to build an entirely new rig.



The Kingston SSDNow V Series SNV125-S2 40GB SSD is one of the least expensive solid-state drives currently on the market.

To be more specific, we'd recommend a Kingston SSDNow V Series SNV125-S2 40GB SSD (\$115) for the OS volume, a Western Digital Caviar Blue WD6400AAKS 640GB 7,200rpm hard drive (\$65) for bulk storage, and an AMD ATI Radeon HD 5770 (\$159). Upgrading to an SSD is one of the most significant ways to increase a system's performance today. The WD hard drive is fast, cheap, and offers more capacity than your current HDD. The Radeon HD 5770 will not only give your system the ability to smoothly play virtually any video format, but it'll also improve gaming performance. And the Radeon will take advantage of DirectX 11 and Windows 7's built-in DirectCompute features, too, such as video transcoding. That's a whole lot of bang for 350 bucks.

Chris B. asked: Over the past year or so, I've rebuilt my system a couple of times and have migrated over from a previous AMD platform to Intel's new Core i7 with an X58 chipset board (Evga X58 3X SLI). Here are the rest of my system specs:

- Intel Core i7-950 3.06GHz
- 6GB Kingston DDR3-1333
- GeForce GTX 285
- WD Caviar Black 1TB
- Onboard sound
- Internal DVD RW and Blu-ray drives
- Hauppauge WinTV tuner card
- Win7 64-bit

I primarily use this system as an entertainment PC, along with some fairly rigorous video editing and DVD burning I do for my family and kid's sports teams. In general, though, I'm a performance nut and want all-around leading-edge performance so that my machines are well balanced and as powerful as they can be for the platform.

I'm looking to upgrade my system again but this time plan on sticking within my current Intel platform. What upgrades would you recommend in terms of best bang for the dollar? I'd rather not spend money on upgrading a component only to realize that in reality that component was fast enough and the money spent is being limited by something else in the machine.

A: This is the type of question we're asked on a continual basis, Chris. We never mind answering because, frankly, our responses are as ever-changing as the technology itself. Looking at your current build, you are very much up to snuff in a lot of areas. In fact, we'd venture to say your machine is faster than many current mainstream home PCs.

Regardless, as your need-for-speed instincts have prompted you, there are ways to squeeze more performance out of your current system build. The first thing to consider is that you're at or near the top end of the performance spectrum for the main system processor. That Core i7-950 and DDR3-1333 memory have enough horsepower that upgrading either will likely not offer as much upside performance as you could gain by tapping into other areas.

Take, for example, your storage subsystem. That WD Caviar Black 1TB hard drive is pretty peppy, relatively speaking, but it can't hold a candle to the responsiveness and throughput of a fast SSD. We'd recommend putting that 1TB drive on a secondary SATA connection as bulk storage, and while you're at it, grab another matching WD 1TB drive for a RAID 1. You can put all your critical files, such as your video footage, on the mirrored array for redundancy and then set up an SSD as your primary OS boot drive. We'd suggest going with something like an Intel X25-M Gen. 2 160GB SSD, OCZ Vertex Turbo 120GB, or Corsair 256GB SSD. Overall, the Intel and OCZ drives are the fastest, but any of today's higher-end brand-name SSD will offer a significant performance boost in terms of boot times, application loading, and file transfers for your video editing and gaming applications.

The next area you want to look at specifically addresses your gaming and entertainment requirement. Although that GeForce GTX 285 is definitely very capable, the fact of the matter is that AMD's ATI Radeon 5800 series is a lot faster. We'd suggest you take a look at the Radeon HD 5870, currently the fastest single-GPU card on the market, or the Radeon HD 5970, which is the current fastest dual-GPU card. We recommend these two cards with one caveat. Nvidia is rumored to have its next-generation GF100 GPU ready for action sometime in Q1 2010. So, in the coming months, there may even be more powerful options. Keep a close eye on the market.

Regardless, either of the Radeons is going to offer significantly higher frame rates, as well as allow higher resolutions at higher image quality settings over the GeForce GTX 285 you have.

J.T. asked: What are your feelings about having a large hard drive for your primary OS volume? I was thinking of installing Win7 and replacing my current 320GB primary drive with something larger: a 7,200rpm 750GB Seagate drive that I have. I have reservations about

using the Seagate drive as the primary drive because I remember hearing something about large OS drives ruining computer performance and that the OS should always reside on the smallest partition in a system. What are your thoughts? Is it OK to have a large drive with an operating system installed on it, or should I just stick to the primary 320GB HD and use the 750GB drive as a backup?

A: There is no problem having a large OS volume in a modern computer. To give you an example, one of our rigs has two 1TB drives running in a RAID 1 configuration, partitioned into two 500GB volumes. One is for our OS and applications, and the other is for our drivers, installers, Outlook PST, other utilities, and Ghost image. Partitioning the drives in this way gives us the ability to restore the backup image in the event of a problem, and we have a repository for important files and installers.

When it was expensive to back up data and drives were slower and less reliable, people used to advocate for a small OS partition. But with today's drives and operating systems, there's no real disadvantage to having a large OS volume.

Riccardo asked: I am not a serious gamer, nor am I a serious overclocker, though I find it all fascinating stuff to say the least. First, here is my hardware description:

- 125W AMD Phenom II X4 965
- Asus M4A785TD-EVO
- 4GB Kingston DDR3-1333
- 500GB Seagate 7200.2
- Standard air cooling

Which leads me to my question. When in Windows 7, CPU-Z tells me the following:

- Core voltage: 0.912 to 0.928v
- Core speed: 803.6MHz
- Multiplier: 4X
- Bus speed: 200.9MHz
- HT Link: 2009.1MHz

The strange thing is that the CPU appears to correctly read its factory speed of 3.4GHz with a 17X multiplier at 1.31V only momentarily. The stranger thing still, while I write this email to you, I can see it constantly fluctuating between the minimum and its supposed correct state. Why is this? Is my CPU defective or somehow not set up correctly in the BIOS?

A: To put you at ease, Riccardo, you're not looking at a defective CPU. It actually appears that everything in your system is working as it should. You are correct, the new 125-watt Phenom II 965 is built with a factory default clock speed of 3.4GHz based off a 17X multiplier that is driven with a 200MHz stock reference clock.

However, what you're seeing in CPU-Z is a real-time reading of your processor's clock speed, as it powers down into its low-power state. Dynamic clock gating and lower power consumption in AMD's and Intel's current desktop processors today are achieved by dropping the core multiplier of the chip, as well as its core voltage, when the chip is idle. This reduces power consumption dramatically. However, when a workload is pushed to the chip, such as the



AMD's new lower-power 125-watt Phenom II X4 965 has faster switching of power states to help reduce power consumption under light workloads or idle conditions.

slight strain word processing might place on it in your email example, the chip scales its clock speed back up to meet system demands. The Phenom II has various low-power states but under heavy workloads will scale up to its full clock speed.

Your Phenom II X4 965 has faster rise and fall switching of its power states, so what you're seeing in CPU-Z is perhaps even more confusing. As a test, try downloading our favorite processor scaling test, Cinebench 10. Invoke a run with it across all cores and watch what happens in CPU-Z while the test renders its workload. You'll see that Phenom II pegged at 3.4GHz. ▲

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com.

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X-ray Vision

AMD Pushes Forward With Bulldozer Architecture

When a CPU manufacturer decides to release a new roadmap, it usually uses a variety of code names for the chips. The code names usually carry a forceful tone, such as "Hammer," and the manufacturer hopes the names add to the momentum and excitement of the new chips.

So it probably makes sense that AMD's most recent roadmap was highlighted by a chip architecture code-named "Bulldozer."

AMD has not released a lot of details regarding Bulldozer, a new chip architecture that's tentatively scheduled to appear in 2011, but it looks like an architecture that can pave the way for AMD for the next few years.

Next Generation

AMD will aim Bulldozer at the high-end desktop, high-end notebook, and server markets. Bulldozer should work with the Opteron 6000 and 4000 series platforms, scheduled to appear in 2010. Another AMD architecture, code-named Bobcat, will appear at the same time as Bulldozer and will work with the low-power, low-priced markets.

AMD's first APU (accelerated processing unit; a CPU and GPU built onto the same die) will be Llano, due in 2011. However, it will not feature the Bulldozer architecture. Instead, Llano will be built using Phenom II cores on a 45nm manufacturing process. APUs featuring Bulldozer may come several

months later, making use of a 32nm manufacturing process.

One concern with AMD's roadmap for Bulldozer is that it will be several months behind Intel's first 32nm chips. Making up that difference is a challenge for AMD, says industry analyst Jack E. Gold of J. Gold Associates.

"AMD is already behind the curve with new technologies, and Intel seems to be leaving them in the dust," Gold says. "Unless they can offer a truly compelling chip, and not just compete on price as they have in the past, they will have a real problem."

It will be interesting to keep an eye on processor releases from Intel and AMD throughout 2010, as both companies

AMD Desktop Platform Roadmap

With its new roadmap, AMD outlined its plans for 2010 and 2011. Here are some of the desktop chips and platforms (listed by code names) that AMD has scheduled.

Bulldozer. Bulldozer will be AMD's new high-performance chip architecture, aimed at the mainstream server, desktop, and notebook markets.

Dorado. Aimed at the mainstream desktop market, the Dorado platform will feature dual-, triple-, and quad-core processors, built on a 45nm manufacturing process.

Leo. Featuring a desktop CPU with up to six cores, Leo is AMD's next-generation, enthusiast-class platform for high-end desktops and gaming computers.

Llano. Aimed at mainstream desktops and notebooks, Llano will be the first in AMD's family of APUs, introduced ahead of Bulldozer and Bobcat APUs.

Zambezi. An enthusiast desktop processor, Zambezi will be the first CPU to feature the Bulldozer architecture, and it will offer up to eight cores.

AMD's roadmap for the mobile market includes: Bobcat, which will feature the same new multithreading architecture as Bulldozer while

targeting low-power, ultra-thin PCs; Brazos, which is an APU featuring the Bobcat core; and Danube, which is the first quad-core mobile processor from AMD and will feature a 45nm manufacturing process.

For the server market, the roadmap includes: San Marino, which is a new DDR3-based server platform featuring four- and six-core processors and aimed specifically at the cloud computing segment, and Maranello, which features eight- and 12-core processors with two- and four-socket platforms in a new DDR3-based server platform. ▲

Source: AMD

AMD Desktop Platform Roadmap			
		45nm	32nm
Segment	2009	2010	2011
Enthusiast	"Dragon" Platform AMD Phenom™ II CPUs Up to 4 CPU Cores DDR2/DDR3 AMD 790FX/GX chipset ATI Radeon™ HD 4000 Series discrete graphics	"Leo" Platform "Thuban" CPUs Up to 6 CPU Cores DDR3 RD890+SB850 chipset DX® 11 discrete graphics	"Scorpius" Platform "Zambezi" CPU 4/8 CPU "Bulldozer" Cores DDR3 AM3 Socket Next-Gen ATI discrete graphics
	"Pisces"/"Kodiak" Platform AMD Athlon™ II CPUs Up to 4 CPU Cores DDR2/DDR3 AMD 785G chipset DX®10.1 IGP	"Dorado" Platform AMD Athlon II CPUs Up to 4 CPU Cores DDR3 RS880P+SB810 chipset with DX® 10.1 IGP	"Lynx" Platform "Llano" APU Up to 4 CPU Cores DX® 11 GPU DDR3
Mainstream			

move toward APU releases in 2011. Intel's new Sandy Bridge architecture, expected in early 2011, should feature an APU on a 32nm manufacturing process. Any delays by either company in releases in 2010 could spell big

problems for the new chip architectures in 2011.

Although processor code names typically are confusing for most of us and only mean something to the company involved, in this case, AMD appears to

have made its intentions clear to everyone. AMD is pushing forward with a new architecture in Bulldozer . . . no matter which other chips are in its way. ▲

by Kyle Schurman

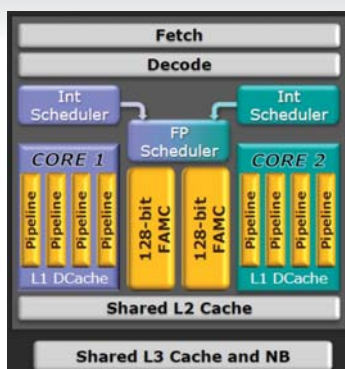
Bulldozer Architecture

AMD has released a generic block diagram of a Bulldozer module, as shown here. More details will be available later this year, but this block diagram shows some interesting features.

As you can see, the single Bulldozer module consists of two cores. Each core has access to its own L1 cache memory area, but the FP (floating-point) unit also can access either or both of the L1 areas. Within each core are four pipelines.

This type of architecture should improve the multithreading capabilities of Bulldozer vs. past AMD architectures, at least for multithreaded integer performance.

The operating system will read each single Bulldozer module as equal to two processing cores, because of the design. So, officially, AMD counts each module as two cores. If you have four Bulldozer modules on the chip, it would be an eight-core chip. This is a little confusing, as past chips have had only one core per module.



Bulldozer, with its two cores per module, requires a different counting method. Also, it appears that cores in Bulldozer cannot be shut down individually to save power; instead, a Bulldozer module would have to be shut down, meaning two cores are shut down at a time.

While the integer scheduler areas and resources essentially are doubled, the FP areas and resources are not. As GPUs continue to access much of the high-end FP calculations, CPU manufacturers are expected to limit the growth of the FP areas on the CPU. There's little

point in devoting additional resources to an area of the CPU that's being rendered less relevant by GPUs.

In AMD's official description of Bulldozer, it's called a "modular architecture that creates the building blocks of the next generation of processor designs." ▲

Source: AMD

Bulldozer In Action

Here are some of the key components and processes Bulldozer will provide.

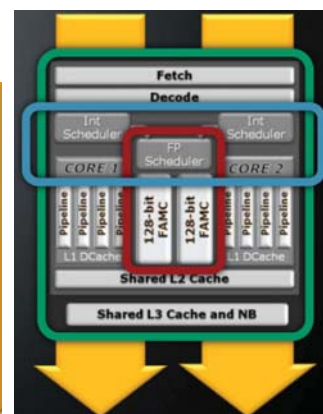
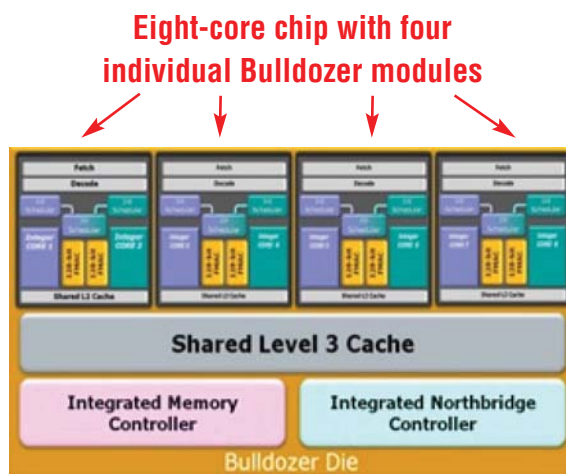
- The OS treats the single Bulldozer module (highlighted in green) like two cores. AMD also counts two cores per module with this architecture. This design should provide improved multithreading performance vs. previous AMD chip designs. Each core will have its own L1 instruction and L1 data cache memory areas, but they will share fetch and decode logic. The two cores and the FPU will share the L2 cache area within each Bulldozer module.
- With this type of design, Bulldozer can execute two parallel threads (highlighted with yellow arrows). Because of the design with its two cores, Bulldozer should not experience bottlenecks while running parallel threads.
- The floating-point unit (highlighted in red) in Bulldozer will carry flexibility in its operation. Within each cycle, the FPU can operate independent of the two cores or it can be shared by the two cores.

"The adjustable FPU should give them some interesting capabilities," says industry analyst Jack E. Gold of J. Gold Associates.

- With the two integer scheduler areas in Bulldozer (highlighted in blue), the two integer schedulers and the FP scheduler should provide more efficient execution of commands than previous designs.

In addition, the shared L3 cache area, the integrated memory controller, and the integrated northbridge (NB) controller listed here are shared between all Bulldozer modules installed. The lower-left illustration represents an eight-core chip (featuring four Bulldozer modules) that shows the shared areas. ▲

Source: AMD



White Paper: Lucid Hydra

Multi-GPU Technology That Breaks All The Rules

In Greek mythology, the hydra was a multiheaded monster where cutting off one head would cause two heads to grow in its place. The hydra has become a staple in fantasy gaming, proving a tough foe for gamers to battle.

Lucid (www.lucidlogix.com) wants to turn the Hydra from foe to friend for gamers.

Lucid's Hydra chip enables a multi-GPU technology. Unlike most of the other multi-GPU technologies currently

available, however, Hydra will work with GPUs that offer varying levels of processing power—even GPUs from different manufacturers. The end user doesn't have to change any settings or worry about proprietary connectors. Hydra,

Hydra 200 Overview

The Hydra engine works through ASIC (application-specific integrated circuit) hardware, along with a software driver. Motherboard manufacturers install the Hydra chip between the northbridge of the CPU and the GPUs.

Hydra uses a combination of hardware and software that Lucid has designed to create its multi-GPU technology. Lucid has 60 employees, including both hardware and software engineers, who specialize in 3D graphics, chip design, and networking, among other skills. Lucid president and co-founder Offir Remez says it's important for Lucid to have employees from a variety of technical backgrounds because Hydra must do many different things.

"The chip needs to handle a lot of data, which comes from everywhere," he says.

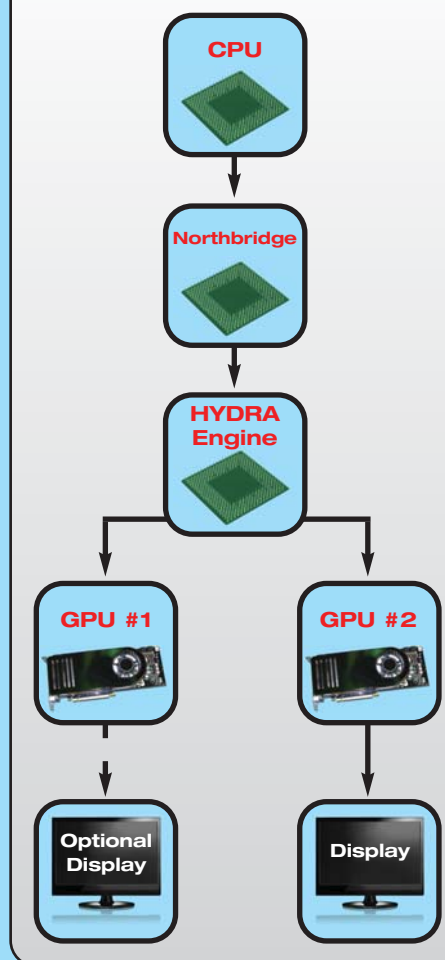
Hydra intercepts the calls and instructions (such as DirectX or OpenGL command streams) sent from the CPU to the GPUs. It then determines and organizes the exact tasks that must be completed.

"There are thousands of tasks and objects involved to create a single frame," Remez says. "Imagine that I can identify each of these tasks, knowing the time they need, the memory required, etc., and imagine I have 1,000 GPUs to do 1,000 tasks. If I can provide to each GPU each task at the same time, then I can combine all of the results in real time.

"In real life, we are trying to do this, but each task is dependent on others," he says. "All of these tasks are related to each other. How do we solve this problem? We scale a single task over multiple GPUs."

Using historical data related to the performance levels of the installed GPUs, the Hydra then distributes the tasks to the GPUs, looking to provide a workload that will maximize the capabilities of each GPU to create a smooth workflow.

Configuration: 1 x16 + 2 x8 downstream ports



The Hydra chips automatically handle working with the GPUs and determining how to divide the workload. If, for whatever reason, the Hydra cannot make the multi-GPU configuration work with a particular game or with a particular combination of GPUs, the Hydra automatically scales down and returns the system to a single-GPU configuration. The user does not have to make any changes to settings for this to occur.

As you can see in the illustration, the GPUs themselves are not connected directly. All data sharing between the GPUs must go through the Hydra chip. Any data shared between the CPU and the GPUs also must travel through the Hydra chip. This configuration allows motherboard manufacturers to create the most flexible options for design.

Because the Hydra system is dedicated to scaling GPUs and because no graphics process logic occurs on the Hydra chip, it improves on current commonly used methods for splitting the workload between a pair of GPUs, alternate frame and split frame.

Alternate frame. With the alternate frame technique, each GPU renders every other frame. The alternate frame technique sometimes causes latency problems, unless each frame requires the same amount of time to process. When the GPUs are not identical, though, the alternate frame technique doesn't work well.

Split frame/tiling. Few dual-GPU architectures still use the split frame technique. When used, each GPU handles the display for a certain part of the screen. The split

frame technique reduces problems with bottlenecks in pixel shading, but, because each GPU must store the entire screen in its memory area, using this technique can cause memory bottlenecks. ▲

Source: Lucid

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which is built into the motherboard, handles everything.

“Say you buy a GPU and nine months later you have the money for another one, but you can’t find an identical GPU with the same specifications,” says Offir Remez, president and co-founder of Lucid. “With Hydra, it doesn’t matter. You just throw [both] in your PC.”

Hydra then allows those two GPUs to work together to provide combined graphics processing power and speed. Remez says the combined benefit is very high, although users shouldn’t expect to receive exactly 100% of the power available from both chips.

“You might not get 100% benefit, but you’ll get pretty close,” he says. “The

GPUs do not need to be the same performance level or from the same vendor. However, if they are, the task is a little simpler, and you get better performance.”

Introducing Hydra

Lucid announced its multi-GPU technology in July 2008. It announced its Hydra 100 series of chips at the Intel

Hydra Engine Architecture

Lucid’s Hydra engine is the first silicon chip that implements RTDP (real-time dedicated processing). The Hydra engine analyzes every frame before rendering, and it distributes the tasks to the GPUs in the system, based on the capabilities and availability of each GPU. Using this type of system allows the Hydra engine to work well with and optimize GPUs of varying levels of rendering power.

By analyzing each frame ahead of time, the Hydra engine minimizes bottlenecks and reduces latency.

Here’s an example of how the Hydra chip works, as shown in this illustration of the Hydra engine.

- 1** The Hydra’s distribution engine reads the information as the game passes it through the CPU. You can think of Hydra as intercepting DirectX and OpenGL calls from the game that are destined for the GPUs.
- 2** The Hydra analyzes the information, breaking it into tasks, which it then passes to the GPUs. A task could be almost anything, ranging from a specific lighting effect to a specific object being drawn. Hydra uses proprietary algorithms to compile the tasks (application profiling and analysis).

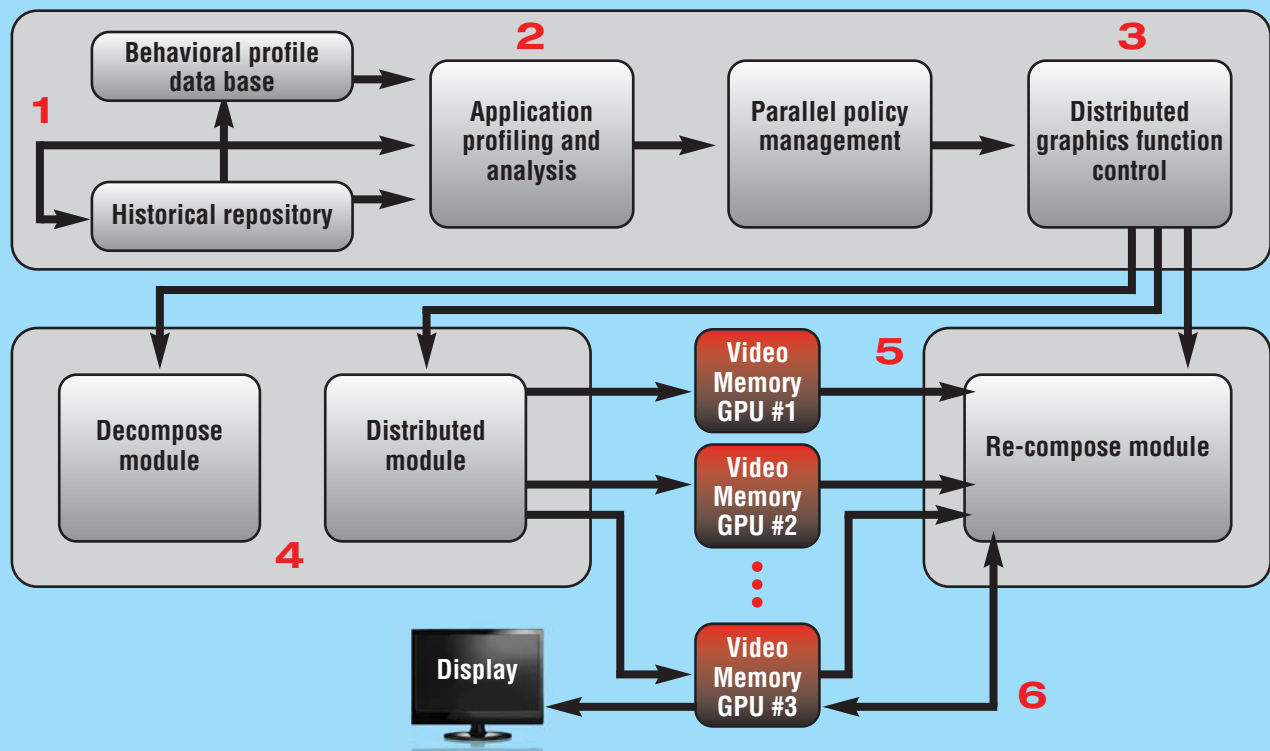
- 3** With the tasks determined, the Hydra chip splits the tasks between the GPUs. It uses its algorithms to break up the workload in an “intelligent” manner, making use of the full resources and capabilities of each GPU (parallel policy management). The Hydra chip automatically estimates the capabilities of each GPU, based on historical performance levels (historical repository). As the work continues, the Hydra chip updates its measurements, based on the real-time performance of the GPUs (behavioral profile data base).

- 4** Hydra then passes the data to the GPUs (through decompose and distributed modules).

- 5** Once the GPUs are finished with the work, they pass the data back to the Hydra chip, where it’s then compiled (re-compose module).

- 6** Finally, Hydra passes the final scene to one of the GPUs, which sends it to the display. ▲

Source: Lucid



Developer Forum in August 2008, although the Hydra 100 didn't quite receive the media attention that the Hydra 200 has received.

"We were a little bit late to the market [with Hydra 100] to be honest," Remez says. "We were late a couple of quarters. [With Hydra 200], we've devised better ways to utilize the chips that were underutilized in 100."

The company introduced its Hydra 200 in September 2009. All three chips in the Hydra 200 family make use of a 65nm manufacturing process and feature a 300MHz RISC architecture. The LT24102 and LT22102 chips use six watts of power and measure 23 x 23mm; the LT22114 uses four watts and measures 18 x 18mm. The Hydra 200 initially works with systems running two GPUs, but in the near future Lucid will include a driver update for the LT24102 that enables three and four GPUs.

At the same time as the Hydra 200 announcement, Lucid announced partnerships with Intel and with motherboard manufacturer MSI, through which the Intel P55-based MSI Big Bang Fuzion will include the Hydra 200.

Lucid's History

Lucid, officially called LucidLogix, is a fabless semiconductor company. Lucid's financial backing has come from organizations including: Genesis Partners, Giza Venture Capital, Intel Capital, and Rho Ventures.

Lucid's R&D headquarters are in Israel, while its sales and marketing headquarters are in Santa Clara, Calif. Lucid has more than 60 patents and patents pending.

"Lucid is a company that I started, together with my co-founder [Dr. Reuven Bakalash], in late 2003," Remez says. "When I say 'started,' we did the napkin thing at the coffee shop. . . . Most of the ideas weren't too good, but we had one we continued to develop."

That idea of employing a multi-GPU design to provide additional rendering power—rather than copying the multicore technologies that CPU manufacturers have favored—has continued to drive Lucid. Obviously, Lucid isn't the only company

offering multi-GPU options, as Nvidia's SLI and AMD/ATI's CrossFire show, but Hydra will be the first to allow multiple GPUs from different manufacturers.

"We considered ourselves to be pioneers in the space," Remez says. "When we thought about it, silicon can't keep growing. Silicon shrinks roughly 33% every cycle, but transistors are more than doubled. The industry's solution was to build multicore [CPUs]. Even the lowest-level CPU will have dual cores."

Considering the nature of graphics processing, it's not a surprise GPUs have avoided making use of multiple cores. Remez says the multicore configuration CPUs currently are using simply doesn't translate well to GPUs, because graphics rendering requires a different type of solution than what works for CPUs.

"There's a huge difference for where graphics are today compared to where we want to go," he says. "The solution of multicore doesn't answer the question of rendering for gaming. Multicore [CPUs] did not answer that question . . . because the rendering task of the game is a sequential pipeline, single-threaded task that didn't take advantage of multiple cores."

The Hydra Sales Pitch

Remez says convincing motherboard manufacturers to make use of Hydra chips is easier than you might think . . . depending on the company.

"If they're familiar with multi-GPU technology, the sale is pretty doable in a fair amount of time," he says, "but getting the motherboard product all the way from a prototype to consumer availability is another challenge."

One feature that makes Hydra desirable is the fact that it isn't dependent on major GPU manufacturers to provide Lucid with proprietary information. Lucid's Hydra chip only needs to know which GPUs are installed—information it can discover through the computer—before it goes to work. Hydra doesn't need to know anything about the inner workings of the GPUs. Lucid chips work with the GPUs through DirectX, including DX11.

"We do have an open channel with all of the [GPU] vendors," Remez says.

"We're in discussion on many items. But there's no technological information that swaps hands. There's no direct interaction between the vendor and us."

In a similar manner, Remez says Lucid holds discussions with game developers, but the company doesn't really need any proprietary information from the gaming companies. Hydra simply reads the instructions from the games and doesn't need to make changes to its operation based on the particular game or GPUs in use.

"The discussion is 'one-sided,'" Remez says. "They ask, 'What do you need from us?' 'Nothing.' 'Then why are you here?' We have nothing to offer the game developers directly, so it's a very weird meeting, but we do it because we want to reach out to them."

Test & Test Again

Although Lucid is aiming Hydra primarily at gamers, it could be used in any graphics-heavy application or in any multiple-display configuration. For now, though, Lucid's testing is focused on gaming.

Remez says testing is a very time-consuming task, as the company attempts to test multiple games with the hundreds of possible GPU combinations. He says that even though Hydra should work with all qualified GPU combinations, testing is critical.

"Although the solution is designed to run a wide range of brand of GPU, when you look at all of the product development, we can't test everything," Remez says. "Visual quality, performance, and stability are so important. We do everything we can to test these things. Then we say these games 'qualify' for these GPU combinations. However, that doesn't mean the others would or wouldn't work, we just haven't tested them yet."

And despite the mind-boggling number of potential configurations to test, Remez says Hydra 200 has had no problem handling whichever configuration Lucid has thrown at it. ▲

by Kyle Schurman

Hydra 200 Models

Three models of the Hydra 200 are available. The LT22114 is the low-end chip, the LT22012 is the midrange chip, and the LT24102 is the high-end chip.

The upstream ports refer to the number of PCI-E lanes in the connection from the Hydra 200 to the CPU/PCI-E controller.

The downstream ports refer to the number of PCI-E lanes in the connection from the Hydra 200 to the GPUs. For example, the LT22012 has two x16 PCI-E downstream connections, or one x16 connection to each GPU.

With the high-end LT24102 (shown here), the downstream connections to the GPU change according to the number of GPUs in the system. For example, with two GPUs, the configuration would be two x16 PCI-E connections, one for each GPU. With three GPUs, you'd have one x16 and two x8 connections. With four GPUs, the LT24102 would set up four x8 connections. The LT24102 configures these GPU connections automatically, with the ultimate goal being the best use of the available resources. No interaction from the user is required.

This Hydra 200 cannot be purchased as an add-on chip; it must be incorporated into a motherboard, meaning any cost for the Hydra would be rolled into the overall cost of a motherboard. Although Lucid hasn't revealed specific prices for the Hydra 200 chips, the company has said

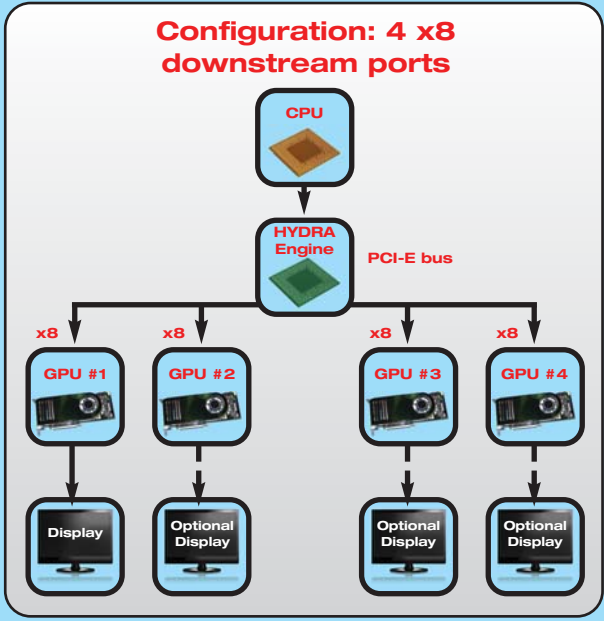
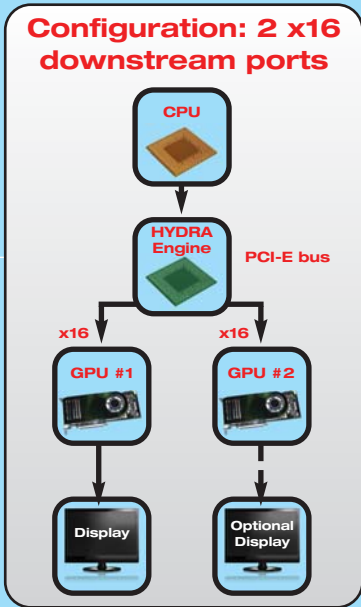
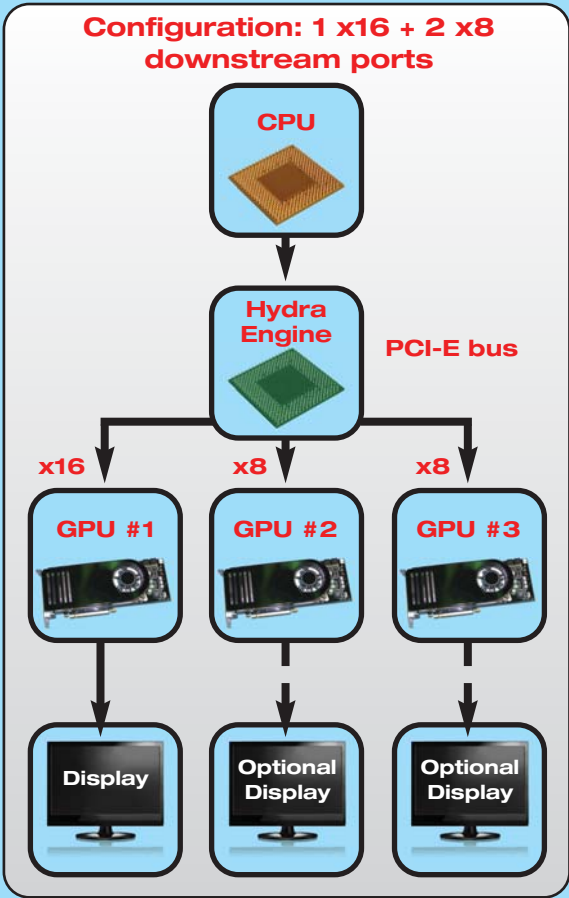
Model Number	Downstream Ports	Upstream Ports	Number of GPUs Supported
LT22114	2 x8	1 x8	2
LT22012	2 x16	1 x16	2
LT24102	2 x16*	1 x16	2 or 3 or 4

**The LT24102's downstream ports also can be configured as four x8 or one x16 and two x8.*

that the increased cost would be equal to about \$1.50 per PCI-E lane, depending on the model of the Hydra 200 in use. For example, the high-end LT24102 carries 16 upstream PCI-E lanes and 32 downstream PCI-E lanes. Based on those numbers, with 48 total PCI-E lanes, a \$72 cost estimate for adding the Hydra 200 LT24102 to a motherboard would be fairly accurate. ▲

Source: Lucid

LT24102 Configurations



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AMD Athlon™ II			
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620 CPU	\$ 599		

NO-LIMITS

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Build Your Own Information Superhighway
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The Great Powerline-Wi-Fi Debate
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We Connected Anything & Everything

NETW

Talk about being taken for granted. For all the fuss we make over the rest of our technological Romper Room (immaculate internal system cabling, perfectly tuned overclocked components, borderline OCD arrangement of the A/V stack), far too many of us receive a big fat *F* on our networks. Yes, lots of you have migrated to the now-ratified 802.11n standard, and we'd wager that a fair share of you have invested in specialized networking hardware, gear that maximizes gaming performance, for example. That's a great start, to be sure, but there's simply so much more.

So, pay attention—class is in session, and we're going to assume you weren't scribbling on your desk and/or texting your chums during Networking 101. Setting up wireless encryption, updating firmware, understanding how MIMO works, adding your 360 to your network, and other such topics are all important, but you don't need to turn to the pages of *CPU* for that

type of expertise. No, this multisession seminar is for anyone who's ever looked thoughtfully at his router and asked, "How can I mod you, little router? In what ways can I unleash the true potential that lies hidden within your plastic hull?"

The centerpiece of our extravaganza is no less than eight full pages of high-end networking know-how. We took ordinary, unassuming networking hardware and turned it into something special. Think of this coverage as a super-sized Mod Project that's all about IEEE 802. There are plenty of "no assembly required" tips and projects, such as creating a DMZ, maximizing your firewall, and benchmarking your network's performance. But for those of you who want to roll up your sleeves and get a little dirty, we have a broad range of undertakings that involve a little slicing and dicing, such as saving a little scratch by making your own Ethernet cables (easier than you might think) and turning your entire house into a network (a bit tougher because we're not talking about

WORKING

WELCOME TO THE SUPER-CONNECTED WORLD

simply plunking down an 802.11x router and a few range extenders). There's really something for everyone within "Networking For Keeps," so even if you'd prefer to take the à la carte approach rather than wolfing down the whole platter, you should come away with a game plan for a better network.

Of course, if after you finish our first dish you find your network's a little lacking, don't make any rash buying decisions until you've read our take on the current wireless technologies—802.11n and powerline. The IEEE 802.11n spec was finally ratified last year, so wireless networking hardware can finally dispatch the hodgepodge of "Draft N" and "Pre-N" names

given to products that were almost, but not officially, 802.11n. It might seem like a no-brainer to take the next step up and transition from 802.11g to 802.11n, but, being the power user that you are, you've probably at least heard of powerline networking. Powerline has come a long way from being a niche product to gaining the backing of the major networking companies and putting up impressive throughput numbers. Both specifications have advantages, but is there a clear-cut winner in this war of wireless standards? "Which Wireless?" has your answer, and you might be surprised by what we discovered.

Finally, we put it all together in what we like to call *CPU's* Ultimate Home Network.

Truly, everything from refrigerators to washing machines has Internet connectivity these days. Now, we didn't go so far as to include an Ethernet-equipped Maytag in our little funhouse, but what we have done is select what we think are the must-haves of any whole-house network. "Home Network, Power User-Style" gives you an illustrated look at how the pieces of the puzzle come together.

For better or worse, we're all digitally connected. It's time to take command of how you yourself are connected—both locally and globally—and build a network worthy of your power user pedigree. ▲

by Vince Cogley

Networking For Keeps

BUILD YOUR OWN INFORMATION SUPERHIGHWAY

There was a time, not very long ago in the grand scheme of things, when desktop computers were standalone devices. Sure, it was common to have a host of peripherals connected to a PC to add certain features or functionality, but linking computers together in what we now call a network was alien to home and small office users.

Since those early days, however, the computing landscape has changed dramatically. Whereas before, BBSes (bulletin board services), dial-up, and, dare we say, Prodigy or AOL were cutting-edge ways to connect, today multimegabit broadband connections are rapidly becoming the norm.

Computers themselves have also become significantly more affordable over the years. Owning even a single PC used to be somewhat of a luxury, but now it's increasingly more common for a home or small office to house multiple desktop systems, notebooks, and netbooks, not to mention NAS devices, media streamers, or HTPCs. And let's not forget a little thing called the Internet—talk about a large network.

The proliferation of broadband connections and the wide availability of cheap computers have forced many casual PC users to learn at least some basic networking skills, if only to share an Internet connection. Throw in large media collections, a few users, the need to quickly share files and documents between systems, and

having a strong knowledge of PC networking becomes a practical necessity for home and small-business users alike.

With that in mind, we've decided to detail a number of networking-related projects and disseminate a myriad of useful tips, tricks, and guidelines for beginning, intermediate, and relatively advanced users. We have some real nuts-and-bolts, hands-on projects on tap, along with some high-level configuration tips, covering both wired and wireless networking technology. By the end of the piece, we hope that we'll have turned even the least network-savvy among you into pseudo-sysadmins, or, at the very minimum, arm some of you with a few new tools that may help solve some common networking conundrums.

Maximize Wireless Performance

As the popularity of notebooks and netbooks has skyrocketed in the last few years, so has the desire of end users to set up wireless networks in their homes or offices. Wireless networks, or WLANs, offer the convenience of untethered network access, allowing users who would otherwise be unable to hardwire a PC to a network to connect the PC wirelessly. Setting up a wireless network can be as easy as plugging in a Wi-Fi-enabled router or access point, connecting it to a broadband modem, and configuring a notebook to use said router as its gateway to the Internet. But, of course, it's not the initial setup of a wireless router that we're interested in here; we're looking for the ways to maximize its performance.

Wireless routers and access points use radio frequencies to broadcast and receive signals that carry network data. Think of



Proper placement of a wireless broadband router is paramount to optimal signal quality and maximum range. For the best results, place the router in a central location away from interference-causing devices, such as cordless phones and microwave ovens.

the transceivers in the AP as two-way radios, similar to a CB or walkie-talkie. A signal sent from one transceiver is picked up by another, and the receiving transceiver sends the requisite response back to the original. Like a walkie-talkie, though, there are a number of things that can interfere with the wireless signal, which affect its range and/or signal quality. Some of the chief culprits are other wireless devices and microwave ovens.

The transceivers in most of today's wireless routers broadcast in the 2.4 and 5GHz bands. Signals sent in these bands typically work best when there are no obstructions between transceivers, but that's not a realistic scenario in most homes and offices. Luckily, the signals will also bounce around in enclosed spaces and pass through certain materials, making it possible for a Wi-Fi signal to permeate a home or small building. To get the best performance from a WLAN, however, there are some guidelines to follow as well as some useful hardware and software modifications.

The first thing to consider is the placement of the wireless router or AP.



Cramming a wireless router or access point in a corner is one of the quickest ways to cut down its range. If you have no other choice, however, adding a high-gain directional antenna can effectively increase the AP's range and focus its signal exactly where it's needed.

Virtually all of the wireless routers sold today use omnidirectional antennas. In other words, the signals broadcast from their internal transceivers radiate out in every direction equally. Because of this, it's always best, whenever possible, to place the router/AP in a central location. Using round numbers to simplify the explanation, if a wireless router has a range of 100 feet in any direction and you have a building that's 200 feet wide, the signal from the router won't make it to the far end of the building if it's stuffed in a corner at the opposite end. Place the router in the middle of the building, though, and it'll cover the entire area without a problem. Placing the wireless router in a central location maximizes its effective coverage area, which will result in more reliable and consistent connections and ultimately better performance.

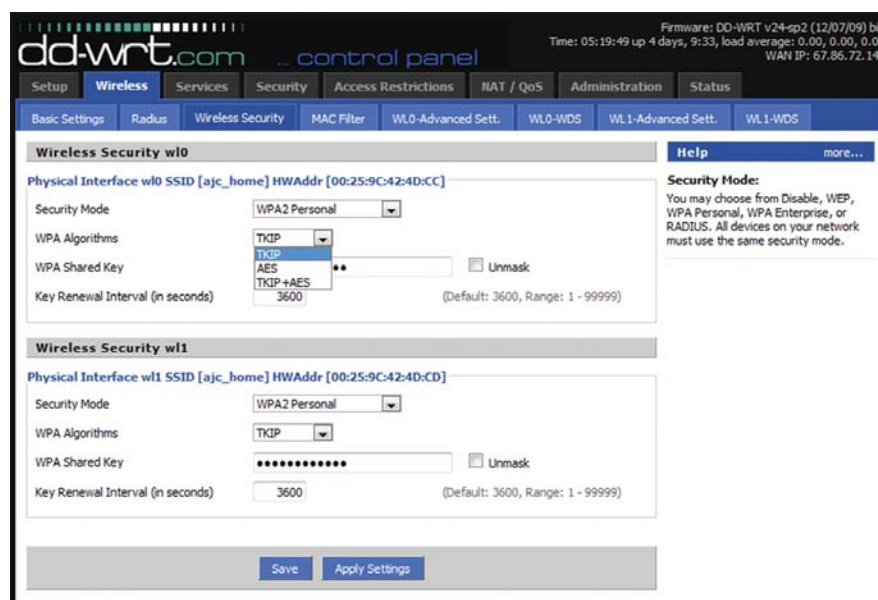
If centrally locating a wireless router isn't a possibility, however, there are still plenty of things you can do to maximize performance. For example, replacing the omnidirectional antennas included with

most wireless routers/APs with directional antennas lets you focus the wireless signal in a single direction and point it at the areas in the building that need the best coverage. Replacement directional Wi-Fi antennas are also typically high-gain antennas that are better able to transmit and receive signals than the basic (and usually cheap) antennas included with today's wireless networking gear.

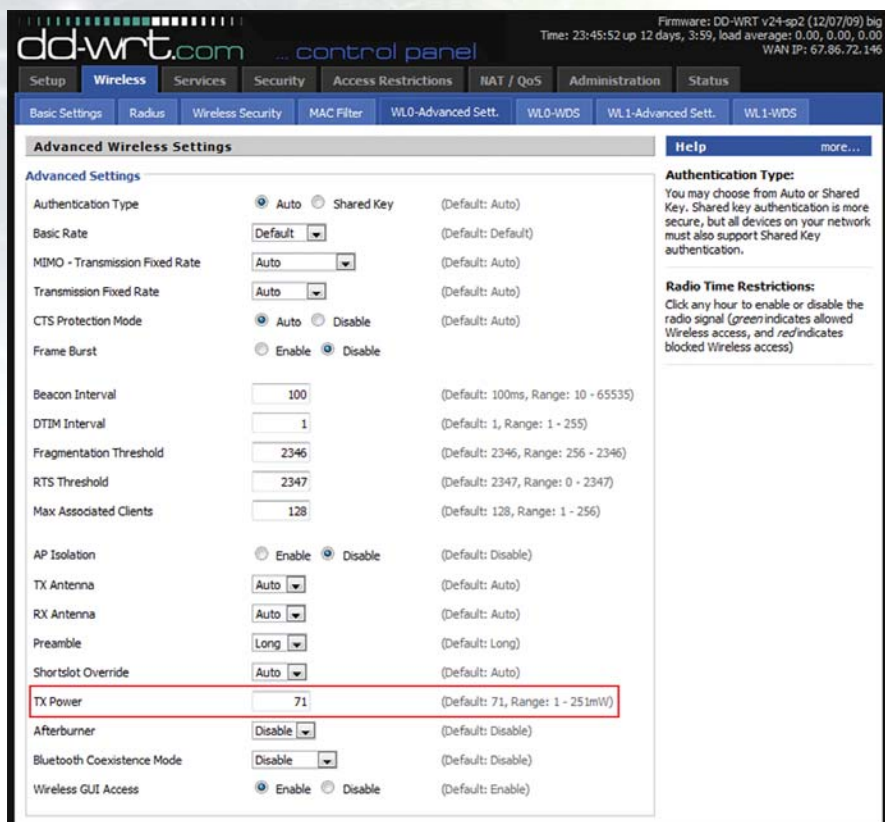
Using a directional antenna is usually as easy as unscrewing the stock antenna and installing the directional antenna in its place (and, of course, pointing it in the right direction). Also note that it's possible to use omni- and unidirectional antennas on the same router or access point, provided it has more than one antenna.

Lock Down That Wireless Connection

It seems that the vast majority of users with broadband connections also have wireless networks set up in their homes or offices. The routers given to users who sign up for service from large ISPs, such as Verizon, often include Wi-Fi support even



Leaving a wireless access point open for public consumption is a nice gesture, but the last thing anyone needs is a bunch of freeloaders using the connection for nefarious purposes (or otherwise). To help prevent unwanted users from using your wireless connection, ensure it is protected by some form of encryption.



Tweaking your router's/access point's transmit power (the TX Power field in third-party firmware DD-WRT) is a relatively easy way to extract more power and flexibility from your wireless network. This value varies from router to router, so it's a good idea to find a range where others have reported success.

if the user didn't necessarily ask for it during installation. Do some warwalking or wardriving on any street in America with a notebook or other Wi-Fi-enabled device, and you'll pick up multiple wireless networks, some of which may even be unsecured. (And no, wardriving/walking isn't illegal in and of itself. Access a network without permission, however, and that's another story altogether.)

Although it may be a nice gesture to leave a wireless network unsecured and allow any passerby access to your connection to the Internet, it's typically not a wise move. Those users may be using the connection for nefarious purposes, such as downloading copyrighted content or covertly accessing other systems on your network. It's possible to set up unsecured hotspots and isolate the users on their own virtual WLAN so they can't access other machines on the network, but for most users, it's best to simply lock down

the wireless connection and prevent unwanted access in the first place.

There are a number of ways to secure a wireless network connection, but the most straightforward method is to enable some level of encryption. WEP (Wired Equivalent Privacy) and WPA (Wi-Fi Protected Access) may have been ironclad in the past, but enterprising crackers can exploit vulnerabilities in both. In some cases, even novices can break WEP with simple software that's readily available online. WPA2, if implemented properly, is more secure and should be your go-to encryption standard.

To enable WPA2 encryption, log in to your wireless router or access point's configuration menu. This is typically done by opening a browser window, navigating to either 192.168.1.1 or 192.168.0.1, and entering the necessary username and password. Once in the router's configuration menu, navigate to the Wireless/WLAN/

Wi-Fi section. (It may be labeled differently, depending on the brand.) There you will usually find a submenu titled Security or Wireless Security. Access the security menu, and you'll usually see a few drop-down menus and text fields. In the drop down labeled Security Mode or Encryption Type, select WPA2 (or whichever method you'd like to use, keeping our earlier warnings in mind). Then in the WPA Shared Key or Password field, enter a strong passkey or phrase—ideally one that uses a mix of letters and numbers. Initially, you will need to enter this passkey on any wireless device that you want to connect to your network.

Some so-called experts may also suggest disabling SSID broadcasting, enabling MAC address filtering, or assigning IP address limits as means for wireless security, but they would be incorrect. All three of these things are easily circumvented and aren't designed to truly secure anything. These tactics may keep Joe Six-pack from finding or being able to connect to your network, but anyone determined to connect to your network will be able to if these are the only things you do to "secure" it.

Mod Your Router's Transmit Power

Another method for boosting Wi-Fi performance is to increase—or, in certain situations, even decrease—the transmit power on the router using custom firmware, such as DD-WRT. In their stock form, most routers/APs do not offer this ability, but with third-party firmware, such as the above-mentioned DD-WRT, installed, altering the transmit power on supported routers is only a few keystrokes away. And although it will void your warranty and is unsupported by router manufacturers, custom firmware such as DD-WRT are sometimes able to not only increase the transmit power of a router but also overclock the router's processor, which also enhances performance. If you need to boost the coverage area of your wireless router and don't want to spend any money on new antennae, hit up DD-WRT's site (www.dd-wrt.com), see if



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your router is supported, and give it a shot. Often times, a bump in transmit power will make a significant impact on the router's range and performance.

Using DD-DRT as our third-party firmware of choice, the first step to tweak wireless transmit power is to log in to the router's configuration menu and navigate to the Wireless Network section. While in the Wireless Network menu, look for the Advanced Settings or the WL0-Advanced Sett. tab and click on it. (Note that if you have a multiband router/AP, there may be more than one advanced wireless settings menu, and you can adjust the transmit power of both.)

On the Advanced Wireless Settings tab, you should see an option labeled "TX Power" or "Transmit Power," with some value assigned. On our Linksys WRT610N, the default transmit power was set to 71mW, with the range being 1 to 251mW. There isn't a broad consensus on what the "optimal" transmit power should be, because it will vary from router to router, but we've produced good results on Linksys routers with a value between 80 and 90mW without introducing additional noise to the signal. Change the transmit power option, save the changes, and reboot your router. Before making a change to the transmit power for your particular router, however, we'd suggest doing a bit of

research to see what kind of success others have had with similar products.

Ethernet Cables 101

If you're a stickler about internal cable management (and let's face it, if you're a regular reader of *CPU*, there's a good chance you are), it stands to reason that you wouldn't want a mess of cables surrounding your system either. If this is the case, being able to make your own Ethernet cables, to exactly the correct length, is a good skill to have in the war against cable clutter.

Making your own Ethernet cables is surprisingly easy, provided you have the right tools and supplies—and a bit of patience. To make your own Ethernet cables, you'll need the cable (obviously), wire cutters, RJ-45 connectors, and an RJ-45 crimper—all of which can be purchased at your local electronics store or home center. With regard to the cable, UTP (unshielded twisted pair) of Category 5 or higher is necessary. CAT 5 only supports 10/100 connections, though, so stick with at least CAT 5e, which supports Gigabit Ethernet, or, even better, CAT 6. Also note that two types of network cable are common, T568A and T568B. They are both essentially the same, save for the arrangement of their twisted pairs.

CAT 5e cable has eight wires of unique colors, twisted into four pairs, covered by

a sheath. To make a cable, strip about 1.5 to 2 inches of sheathing from the cable to reveal the twisted pairs beneath. Then, unravel the twisted pairs up to the cut in the sheath and use your fingers to flatten and straighten them out. Next, you'll need to arrange the individual wires in a specific order.

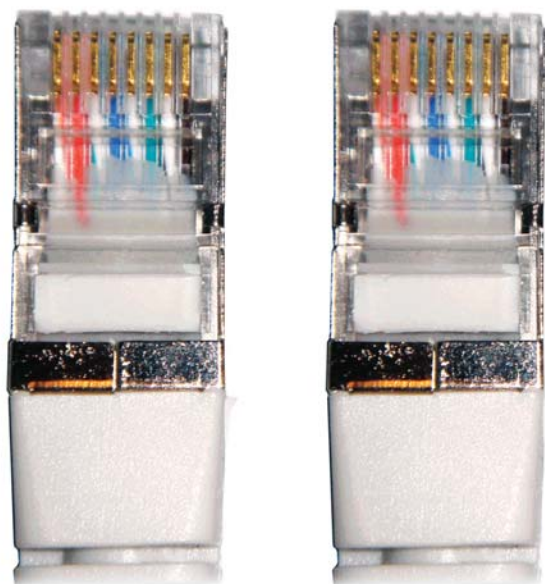
T568A Cable:	T568B Cable:
1 - White / Green	1 - White / Orange
2 - Green	2 - Orange
3 - White / Orange	3 - White / Green
4 - Blue	4 - Blue
5 - White / Blue	5 - White / Blue
6 - Orange	6 - Green
7 - White / Brown	7 - White / Brown
8 - Brown	8 - Brown

When the exposed wires are straight and arranged in the proper order, cut them all to an equal length of about .5 to .75 inch using the wire cutter.

Now it's time to slide on an RJ-45 connector. RJ-45 connectors look like large phone plugs, with a tab on one side and eight metal contacts on the other. With the tab facing downward (toward the floor) and the metal contacts facing upward (toward the ceiling) and pointing away from you, position 1 in the RJ-45 connector will be to the far left, position 8 will be on the opposite end. Slide the exposed wires into the RJ-45 connector until they are all flush with the front edge and a portion of the cable sheathing has been inserted. Then, being careful not to dislodge any wires, slide the connector into the RJ-45 crimper and squeeze the handles firmly until the crimp is tight.

Follow the same procedure to strip, unravel, straighten, and cut the cable and wires at the other end; insert them into another RJ-45 connector; and crimp it. Congratulations on your first Ethernet cable.

The procedure we've detailed here is good for making standard, straight-through Ethernet cables, the most common type used to connect a system to a switch or hub. There is another type of cable called a crossover cable that can be used to directly connect two systems to one another in the absence of a hub or switch, but these are



It's rare that store-bought Ethernet cables are exactly the right length for a given application. For times when a common 6- or 12-foot prepackaged cable just won't cut it, roll your own. With the right tools, making your own custom-length Ethernet cables is actually quite easy.

not nearly as common. For the vast majority of home or small office networks, straight-through patch cables are all that will be necessary.

Your Home, Now With More Ethernet!

Many of the same skills and knowledge needed to make Ethernet cables can be used when wiring a home for network connectivity. Years ago, computer networks simply weren't considered when homes were built. But today, everything from cable boxes to game consoles can benefit from a network connection. If you happen to be one of the lucky few in the process of building your own home, we'd highly recommend working with your electrical contractor to wire every room for Ethernet and phone connectivity. The convenience and peace of mind that comes from having a wired network connection in every room in the house is something that every geek would love.

Properly wiring a home for network connectivity usually entails running cables to every room and then to a central location where a network/phone panel organizes all of the connections. The

network/phone panel doesn't typically function as a switch or hub. Most often, it's a simple panel where patch cables are connected when necessary. Need to enable the Ethernet jack in the guest room? Simply connect a patch cable to the necessary jack and then connect another to your switch, and you're done. Each room will have a wall plate with the necessary phone and network jacks. The price of entry for such a panel is around \$150.

With older homes, though, the process is much more painful. We'd still recommend using a quality network/phone panel, but running the cables to each room will require some creative routing through studs, floors, and walls, and alongside pipes. And you'll need some special tools for the job. An electrical contractor would gladly tackle the job, but it will cost a small fortune. And, other than the hassle, there's no reason you can't do it yourself.

Should you want to wire your own home for network connectivity, you'll need the following: network cable (again, CAT 5e or higher, ideally), RJ-45 wall jacks and outlet boxes, the network/phone panel, a 110 punch down tool, wire snake,

flashlight, and drill. It's also best to work with a partner. Tackling the project solo makes it exponentially more difficult.

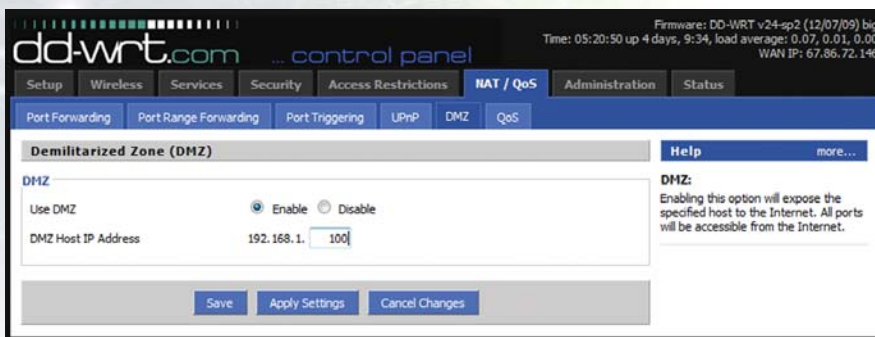
Pick a central location that's dry, easy to access, and has electricity, such as a basement or attic. You'll want a spot where you can easily route cables through wall studs or, if necessary, flooring. When running the cables, it's usually easiest to start in one of the rooms you want to wire and use a wall on the house's perimeter. Drill a hole in the wall through the drywall or plaster where you'd like to install the RJ-45 jack and shine a light into the hole while your partner looks up or down through the wall studs. If your partner spots the light, start feeding the cable through the hole with the wire snake through the studs until there's enough cable to connect to the jack and panel with some slack to spare. Sometimes it won't be possible to cleanly route a wire through studs, however, in which case it will be necessary to drill through floors or other walls. In those instances, make the holes in closets or in inconspicuous spots where possible. In some cases, the best route may be from the basement or crawl space to the attic and then back down into



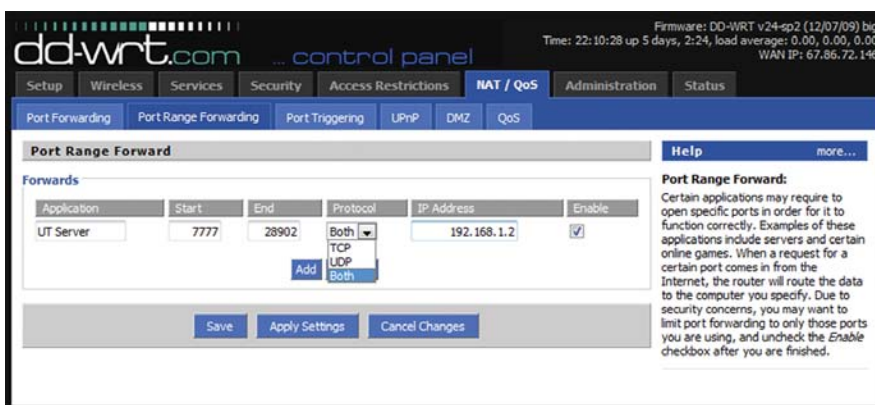
There are a number of ways to wire a home for network connectivity. For optimal results, though, using a high-quality network and phone access panel will usually yield the best results. It may even add value to your home.



Wiring wall plates in a home or office for network connectivity is no more difficult than making an Ethernet cable . . . if the wires are already run through the walls, that is.



To diagnose connectivity or firewall issues, experiment with software firewalls or related security software. Or to expose a server to the outside world, setting up a DMZ (demilitarized zone) on your network can be quite useful.



For those times when setting up a DMZ is overkill, opening specific ports in a firewall and forwarding traffic on those ports to a designated system may be all that's required. Virtually all broadband routers have the ability to open ports and direct traffic to a specific IP address if necessary.

the room. Keep all of this in mind when planning the cable routes. Also, try to avoid running the cables alongside electrical wiring. A home's electrical wiring can cause EMI, which could negatively impact network performance.

Should you be able to successfully route the wires throughout your home, making the necessary connections at the network panel and wall jacks requires little more than matching up some colors and securing the wires in place with the punch tool. First, cut the necessary hole in the drywall/plaster to mount the outlet box. This typically requires nothing more than a sharp utility knife, and once the box is pushed into place, tightening a couple of screws will secure it in place. Feed the wire through the outlet box and mount it. Then, trim the cable to the

appropriate length and strip some sheathing from the end just like we explained in the previous section. Next, unravel the twisted pairs of wire. The wall jack will have a group of contacts, each labeled with the same color scheme as the cable. Simply match each colored wire to its corresponding contact on the jack and use the punch tool to make the connection and lock it into place. Then mount the jack into the outlet box. Follow the same procedure to strip the cable at the network panel, punch down the wires to your preferred jack, and you're done.

Demilitarize Your Zone

If you are unfamiliar with the term DMZ (demilitarized zone) as it relates to networking, it's basically an unprotected portion of an internal network commonly

used to connect servers, such as Web, FTP, or email servers, that need to be accessed by remote clients to the Internet. The idea behind a DMZ is to place public servers on an isolated part of a network to provide an extra layer of security between the internal network and the outside world. In some situations, using a DMZ can even help improve overall network throughput, as well, because traffic routed to the systems in the DMZ won't saturate the internal network. A DMZ can also be useful to diagnose connection problems to the Internet. If a system connects properly when in the DMZ but not when behind a firewall, for example, you'll know there is a configuration issue with the firewall.

Setting up a DMZ in a home or small office usually means exposing one or more systems to the Internet to serve a specific purpose, such as hosting a game server or testing Internet connectivity problems that may be caused by a closed port. With most broadband routers, putting a machine in a DMZ means all data coming in on all ports will be forwarded to that one machine. That machine(s) will lose firewall protection and be exposed to all exploits from the Internet. Generally speaking, this is a bad idea, but it is sometimes necessary to place a machine in a DMZ to ensure external clients can connect to it through the Internet. If you must put a system(s) in a DMZ, at the very least we'd recommend keeping every system in the DMZ patched, up-to-date, and protected by antimalware software.

Depending on the router, setting up a DMZ is usually a simple process. To do it, log in to the router's configuration menu. Navigate to the NAT/QoS/Firewall section, and you'll usually see another submenu option labeled "DMZ." On the DMZ submenu, enter the IP address or addresses of the systems you'd like in the DMZ and save the changes. Some routers will block the systems in the DMZ from being able to connect to other systems on the internal network.

Poke Holes In Your Firewall

Whereas setting up a DMZ and completely exposing a system to the outside

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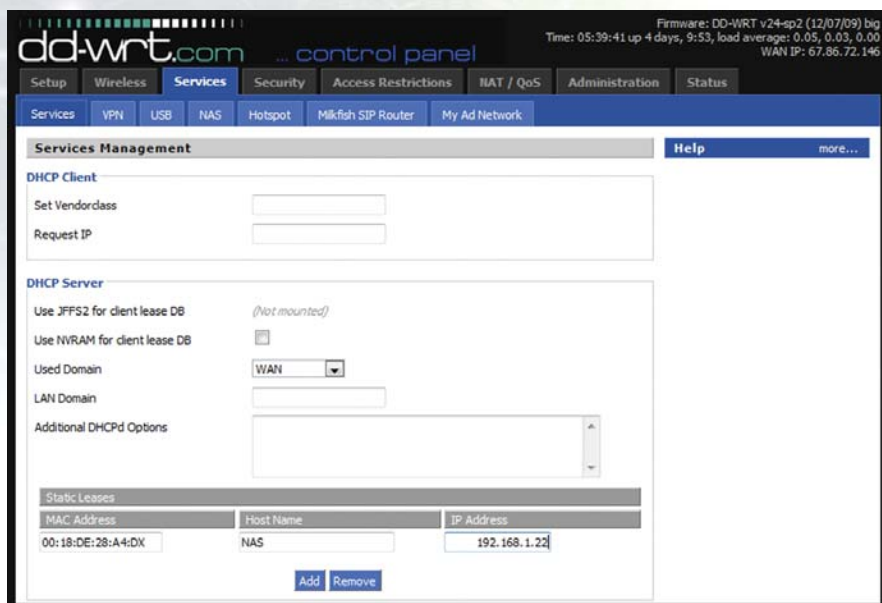


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DHCP by its very nature dynamically assigns IP addresses to devices connected to a network. However, reserving an IP address for a system or device and ensuring it always gets the same IP is possible and sometimes necessary.

world is sort of a no-holds-barred approach, opening specific ports and forwarding traffic over those ports to a designated system is a safer bet. When a system is in a DMZ, traffic from all ports is essentially funneled to it. But as an alternative, users can also open only specific ports when necessary to minimize vulnerability and exposure.

Running a game server or using something such as Remote Desktop from behind a broadband router will require the opening of some ports to ensure a connection over the Internet is possible. If the necessary ports are closed, when a request is sent to the server, the router will reject the request and a connection won't be established.

Opening ports in a router is another fairly straightforward task. But before beginning, you'll need to know which ports to open and where to forward them for your given application. Let's use Remote Desktop as an example. By default, Remote Desktop uses TCP ports 3389 and 80. Now, many ISPs block traffic on port 80 to prevent users from hosting a Web server on a consumer-grade Internet connection, so let's assume that port 80 was changed to port 1234 during the initial setup and configuration of Remote Desktop. That means

TCP ports 3389 and 1234 need to be opened. In addition, you'll also need to know both the internal and external IP address of your machine. To find your external IP, simply go to www.whatismyip.com (or a similar site), and it'll display your external IP on-screen. For the sake of this explanation, let's say our external IP address is 64.58.21.13. Next, open a command prompt, type `ipconfig`, and press ENTER. In the IPv4 Address field at the top of the list that is displayed, you'll find your internal IP address. Let's say our internal IP address is 192.168.1.100.

So, now we know the external IP address, internal IP address, and which ports to forward. To open the ports in the router, log in to its configuration menu. When the router's configuration menu appears, again click the NAT/QoS/Firewall section, and you'll usually see another submenu option labeled "Forwarding," "Port Forwarding," or something similar. After you enter the Port Forwarding menu, you'll see a number of fields and drop-down menus. In the From and To fields, enter the port numbers that need to be opened; in our case, the ports are 3389 and 1234. Then select TCP from the Protocol drop-down menu. In the IP address field, enter the internal IP

address of the system to which the ports are to be forwarded; we would enter 192.168.1.100. Then enable and save the changes. At this point, the ports have been opened, and traffic from the ports will be forwarded to the machine with the IP address 192.168.1.100.

With the necessary ports opened, you're now ready to remotely connect to the machine. To do so, however, you'll need to use its external IP address. From a remote client, for example, you'd have to enter `http://64.58.21.13:1234`. When the request is sent to the external IP address using port 1234, the router will automatically direct the traffic to the internal IP address you designated in the Port Forwarding field.

Make Reservations

Virtually all of today's broadband routers are configured to use DHCP (Dynamic Host Configuration Protocol) by default. DHCP is used to dynamically assign an IP address from a pool of available addresses to a device on the network. By design, DHCP will assign a new IP address to a device on the network at a given time interval. This means the internal IP address on a system may be 192.168.1.100 one day and 192.168.1.105 the next. For most day-to-day computing scenarios, this isn't an issue: The change is completely transparent to the end user. But in some situations, such as our Remote Desktop example, changing a machine's IP address could cause a problem. In the Remote Desktop example, if the system's IP address is changed, the ports will no longer be forwarded to the correct machine.

To work around this scenario and prevent potential problems associated with changing a system's or device's IP address, most routers give you the ability to reserve an IP address for a given system/device while preserving the DHCP service to other machines. By reserving an IP address for a system or device, anytime the DHCP leases are renewed, said device will be assigned the same IP address. If you have a device where ports are being forwarded or that

can be remotely administered or accessed over the Web, reserving an internal IP address for it will ensure it's always available at the same IP.

To reserve an IP address for a system, log in to your router's configuration menu and navigate to the DHCP or Services menu. (This menu may have a different name depending on the manufacturer of your router.) On this menu, you will see an option labeled "DHCP Reservations," "Static DHCP Leases," or something similar. In this section, you'll have to enter the MAC address, host name, and IP address of the system or device you'd like to reserve an IP address for. If you're not sure of your system's MAC address or host name, you can usually find them on the router's status or administration page.

Once you have the necessary information for the DHCP reservation, simply enter it into the right fields on the DHCP or Services menu in the router and save the changes. It may be necessary to reboot the router at this point, but once complete, the DHCP reservation will be in effect.

Serve Up Alternative DNS

Anytime a URL is typed into a Web browser, the browser doesn't inherently know where to find the Web site on the Internet. What actually happens when an address such as cpumag.com, for example, is entered into a browser, is that a request for resolution is sent to a DNS (Domain Name System) service, and the DNS service reports the correct IP address for the Web site back to the browser and directs it there. DNS is an integral part of the Internet, and as such, many ISPs have their own DNS servers that cater to its customers.

The DNS servers used by ISPs can sometimes be inferior to alternative solutions, however. With some ISPs, the DNS servers associated with the service may be slow to respond or may serve only a relatively small group of users, which means they're able to cache only a select few IP addresses and Web site data. Some DNS services also allow unwanted redirects and ignore known phishing or malicious malware distribution sites.

Network Address Server Settings (DHCP)

DHCP Type: **DHCP Server**

DHCP Server: ☒ Enable ☐ Disable

Start IP Address: 192.168.1.100

Maximum DHCP Users: 50

Client Lease Time: 1440 minutes

Static DNS 1: 8.8.8.8

Static DNS 2: 8.8.4.4

Static DNS 3: 192.168.1.1

WINS: 0.0.0.0

Use DNSMasq for DHCP: ☒

Use DNSMasq for DNS: ☒

DHCP-Authoritative: ☒

With some ISPs or DNS (Domain Name System) resolution services, resolving a DNS lookup can delay the time it takes to display a Web page in a browser. Using an alternative DNS resolution service can alleviate some performance- and (potentially) security-related issues.

But services such as OpenDNS (www.opendns.com) correct all of the aforementioned shortcomings. OpenDNS caches data on countless Web sites, so when a request is sent from your browser, it will get a response almost instantaneously. OpenDNS also blocks phishing Web sites using data collected from Phishtank (www.phishtank.com) and can automatically correct common typographical errors, which often prevents users from being redirected to malicious or otherwise unseemly Web sites. Mistakenly type computerpoweruser.cim into your browser, and you'll still end up at computerpoweruser.com.

To use OpenDNS or a similar DNS service, you'll need to input the necessary IP addresses for OpenDNS' servers into specific fields in your router. (If you don't have a router, they can also be entered into Windows' network settings, but we're going to assume you have a broadband router.) Enter your router's configuration menus and navigate to the WAN or Internet Setup screen. Once there, you should see a section labeled DNS Settings or Network Address Server Settings, depending on the brand of router. In that section, there will typically be fields for three static DNS server IP addresses. By default, they'll most

likely be blank, which will use your ISP's servers. Entering in the IP addresses for OpenDNS or a similar service here will direct all DNS requests to those servers.

For OpenDNS, type **208.67.222.222** into the first Static DNS field and **208.67.220.220** into the second. Finally, put your router's internal IP address into the third field. Putting your router's IP address into the third field will allow it to use your ISP's servers, should the servers in Static IP fields 1 and 2 be down. Once the IP addresses are entered, save your changes and reboot the router and your broadband modem.

Connected In Style

For most of us, tinkering with passkeys and port assignments isn't nearly as fun or exciting as pulling off a monster overclock or modding a GPU, but the vast array of interesting networking-related projects suitable for power users could fill volumes. While the projects may not boost benchmark scores or impress friends at a LAN, a properly configured and tweaked network will be more secure and offer better performance all around for its users, which is something every power user can appreciate. ▲

by Marco Chiappetta

Which Wireless?

THE GREAT POWERLINE-WI-FI DEBATE

Let's come out with the hard-hitting truth right here at the beginning: Regardless of whether you're an enthusiast gaming at home or an IT admin managing several machines, Gigabit Ethernet should be your go-to networking technology. It's not only affordable (it's hard to beat the price of a controller integrated on most motherboards), but it's also fast. In fact, unless you're transferring data between a couple of SSDs or mechanical hard drives in RAID 0, there's a good chance that you'll hit a storage bottleneck before taxing the maximum throughput of a Gigabit Ethernet connection.

In an ideal world, we'd all live in homes and work in offices wired for GbE transfer rates. But the reality is that most of us don't have easy access to our preferred networking interface, hence the popularity of 802.11-based WLANs.

From Wired To Wireless

Of course, embracing the convenience of a wireless network means making sacrifices elsewhere. To begin, there's cost. Whereas any modern motherboard will have a built-in Gigabit controller already factored into its price, a wireless adapter adds \$20 to \$100 per connected system to your bottom line (and that's assuming you've already purchased a wireless router or access point). Performance also takes a hit. What you give up in this regard depends almost wholly on the 802.11 protocol your wireless equipment employs.

For example, access points and adapters based on 802.11b started trickling out in 2000 offering 11Mbps—absolutely paltry compared to gigabit performance. Moreover, 802.11b's 2.4GHz frequency

band was susceptible to interference from cordless phones, microwaves, and Bluetooth radios. The real clincher for 802.11b, though, was its relatively low cost, which made wireless technology accessible to just about anyone.



We used the Netgear WNDR3700 as home base for our wireless and powerline testing. Sporting dual-band 802.11n and Gigabit Ethernet, it helped keep both tested technologies on even footing.

In contrast, 802.11a, which rolled out very shortly after 802.11b, was quite a bit more expensive. But this protocol offered significantly higher maximum throughput (up to 54Mbps) thanks to a different physical layer. It operated at 5GHz rather than 2.4GHz and was consequently less affected by interference from other wireless devices. Unfortunately, 802.11a's higher-frequency operating band was limited to a maximum effective range roughly one-third of 802.11b. As a result, the former was often seen as a business-oriented technology, while the latter simply became the standard for home use.

The ratification and subsequent flood of 802.11g-based wireless devices folded benefits of previous-generation protocols together. Although it operated in the same 2.4GHz band (and continued to suffer interference from other wireless electronics), 802.11g leveraged the same physical layer as 802.11a, also achieving up to

54Mbps. The performance picture became a little murkier when you started mixing the newer standard with backward-compatible 802.11b devices, though, as maintaining legacy support negatively affected data rate, as even g-to-g connections suffer in a mixed network. Nevertheless, 802.11g unquestionably improved the throughput of most home-based wireless networks while maintaining the range and cost advantages of 802.11b.

But it was only a matter of time before that 54Mbps spec gave way to something much more aggressive. Enter the recently published 802.11n specification, which supports data rates of up to 600Mbps through the addition of MIMO (multiple input, multiple output) antenna configurations and a doubling of channel width to increase bandwidth. The good news is that's quite a bit closer to Gigabit-level performance than any other networking technology available to power users. The bad news is that number represents a net ceiling; you'll likely never see anything even close to 600Mbps in the real world, and the farther you move away from the transmitter, the worse performance will get.

Up & Running With "n"

Be careful when you shop for 802.11n-based hardware. The specification facilitates operation in the 2.4 and 5GHz frequency bands, extending backward-compatibility to 802.11a/b/g devices. But wireless vendors have a lot of flexibility to build "n"-labeled products that don't offer both radios. Thus, not every router that says "802.11n" is guaranteed to include the full suite of capabilities or even the same performance profiles. For example, the Netgear WNDR3700 router we tested

is a flagship in the company's lineup. Two other Netgear models employ different antenna and channel arrangements to deliver lower throughput ceilings.

Consider our experiments here a best-case scenario for 802.11n. We have the aforementioned Netgear dual-band Wireless-N router and a pair of WNDA3100 dual-band USB adapters to measure the performance of a pure 802.11n-based network. We also tested with an 802.11g-based card from D-Link in order to gauge the effect of adding another vendor's older technology.

We conducted our performance measurements in a real-world environment—specifically, a 1,600 square-foot, wood-framed, single-story house. We ran half of the tests in the same room as our wireless router. This is really just a baseline for the sake of convenience. If your PC is in the same room as the rest of your networking equipment, getting a Gigabit Ethernet line over to the router shouldn't be too difficult. We conducted the rest of the tests from across the house, with the wireless signal passing through two walls before reaching our client system. At each location, we measured using the 2.4GHz band and then retested on the 5GHz band. Netgear's WNDR3700 lets you operate both bands simultaneously, making it easy to switch from one network to another.

Wireless technology has been around for long enough that native support in most modern operating systems is fairly extensive. Unfortunately, the same can't always be said for the wireless vendors themselves. Because Netgear doesn't yet offer a Windows 7 driver for its dual-band WNDA3100 adapters, we used a pair of notebooks running 32-bit copies of Windows Vista. We kept the router disconnected from the Internet, disabled encryption to maximize throughput, and allowed automatic channel selection.

Taking performance measurements from three different applications (Iperf, SiSoftware's Sandra 2010, and PassMark's PerformanceTest), our results came in shockingly low. With the router and

adapter in the same room, the 2.4GHz and 5GHz bands both hit just over 26Mbps according to Iperf. When we moved our notebook to the second location roughly 70 feet across the house, the 2.4GHz radio dropped to 8.1Mbps, while the 5GHz band dropped to 9.7Mbps in Iperf. SiSoftware's Sandra 2010, which reports in megabytes per second (rather than megabits) demonstrated 7.17MBps and 8.31MBps in the same room for



Alas, Netgear's WNDA3100 still doesn't support Win7. However, WinXP and Vista users should have little trouble connecting wirelessly.

5GHz and 2.4GHz 802.11n, respectively. Placed in the same spot across the house, the 5GHz radio actually dropped to 1.6MBps, while the 2.4GHz was able to maintain 4.17MBps. And PassMark's PerformanceTest showed the 2.4 and 5GHz networks performing similarly, each hitting between 31 and 32Mbps.

When you consider that this hardware configuration is actually rated for 300Mbps, even our fastest result—Sandra 2010's 8.31MBps score for the 2.4GHz band (which converts to just over 60Mbps)—is still way off the mark. Compared to the hundreds of megabits per second of real-world throughput enabled by motherboard-integrated Gigabit Ethernet, even the latest 802.11n-based solutions seem like they should be relied on for convenience only when wired networking isn't available.

Powerline: An Alternative To Wireless

Clearly, you pay a hefty price to shed the cables and adopt wireless technology. And although 802.11n extends range and speed over the protocols that came before it, our benchmark results show that the

penalty for moving away from your router or access point is still severe.

Here's where the HomePlug AV powerline specification comes into play, purportedly conceived to serve up a wide enough pipe to handle high-def video and the low latency needed for VoIP communication. The technology employs the power lines running to every single room in your house, theoretically pushing up to 200Mbps. Though it converts data into a modulated carrier feed, it's still possible to apply 128-bit AES encryption, locking down sensitive information in buildings where shared electrical wiring might otherwise make powerline susceptible to security compromise.

If you think configuring a wireless network is easy, then getting Netgear's XAVB1004 Powerline AV Adapter Kit up and running is even more of a cinch. The process literally involves plugging the powerline adapter into a wall socket close to your router and running the included Ethernet cable between them. From there, plug the bundled 10/100 Ethernet switch into the electrical socket where you want to extend the network. Attach any consoles, DVRs, TVs, or PCs that need connectivity, and you're off. Netgear says the powerline kit will work in any house up to 5,000 square feet, though environmental factors, network traffic volume, and building material all affect real-world throughput.

In order to gauge the performance of our powerline-equipped network, we used the same WNDR3700 router, connecting it to Netgear's XAV101 adapter via Ethernet. Data travels through the wall and out the other end to the XAV1004 Ethernet switch, to which we attached a pair of notebooks running Vista, a PlayStation 3, and Samsung's UN55B8000 LCD TV (for access to Internet-enabled widgets).

The bad news is that if you were to use powerline-based technology in the same room as your router, it'd likely underperform an 802.11n setup rated for 300Mbps. In our same-room measurements, Iperf reported 18.4Mbps of throughput, Sandra 2010 scored 4MBps, and PassMark's

When You Can't Go Gigabit . . .

We tested network throughput with three different applications: Iperf, SiSoftware's Sandra 2010, and PassMark's Performance Test. These were performed in a real-world environment—in our case, a 1,600 square-foot home. In our same-room tests, roughly five feet separated the wireless client and router, or the router and the nearest electrical socket. Tests across the house were separated by roughly 70 feet and two walls. ▲

PerformanceTest yielded 25.85Mbps. Consider those results a solid baseline but bear in mind that client systems in close proximity to a router or switch remain best served by a wired Gigabit connection.

As you move away from the powerline kit's Ethernet adapter and across the house, it's easy to see that this technology holds up quite a bit better than the 802.11n setup. According to Iperf, throughput dropped from 18.4 to 18Mbps. Sandra 2010 reported a drop from 4 to 3.8Mbps. Perhaps a more meaningful result to the folks looking to attach devices on a second floor or in a basement, it's truly impressive to see the often underestimated powerline gear losing such little bandwidth to distance. With that said, your results may be different depending on the quality of your home's electrical work.

Although those numbers aren't going to be sufficient for streaming Blu-ray-quality content from a media server onto an HTPC, they are ample for most other forms of high-def video. It was also interesting to note that while our USB 2.0-attached wireless hardware exacted anywhere between 20 to 35% CPU utilization on our Core 2 Duo-based notebooks, the powerline connection hovered around 5% utilization. And the 802.11n

throughput numbers reported by Iperf on a second-by-second basis jumped around quite a bit. In comparison, the powerline kit's delivery was much more consistent.

Comparing Technologies

There's no question that wireless networking is the most popular alternative to a wired Ethernet setup. But is it the fastest? The answer is going to depend on how far your client systems sit in relation to your router or access point, the obstacles between them, and the protocol you're using. The recently published 802.11n specification paves the way for performance of up to 600Mbps. However, in our handful of metrics, the technology fell well short of the 300Mbps touted by the companies behind today's best 2.4/5GHz dual-band wireless routers.

	802.11n		Powerline
	2.4GHz	5GHz	
Iperf			
Same room	26.1Mbps	26.2Mbps	18.4Mbps
Across house	8.1Mbps	9.7Mbps	18.0Mbps
SiSoft Sandra 2010			
Same room	8.31Mbps	7.17Mbps	4Mbps
Across house*	4.17Mbps	1.6Mbps	3.8Mbps
PassMark PerformanceTest			
Same room	32.32Mbps	30.86Mbps	25.85Mbps
Across rouse	23.30Mbps	12.35Mbps	24.02Mbps
Setup difficulty (on a scale of 1-5, easiest to hardest)	2		1
Setup time estimate	10 minutes		5 minutes
Price	\$270 (router and one adapter)		\$179 (kit with adapter and Ethernet switch)

Our test mule for the HomePlug AV standard, Netgear's Powerline AV Adapter Kit gives you everything you need to attach four devices to an electrical outlet.



In contrast, the HomePlug AV powerline specification is much less known and not nearly as quick, at least in theory. Although our benchmarks showed powerline underperforming 802.11n in the same room, moving across the house—a more realistic usage scenario—showed Netgear's powerline kit maintaining most of its baseline performance. Because its real-world throughput is fairly modest, and because it maintains a fairly consistent data transfer rate, powerline seems best-suited to mainstream task-based applications (gaming on a PlayStation, recording television content to a networked server, or streaming high-def video) rather than a performance-oriented environment where large file transfers would demonstrate its lower bandwidth.

Granted, your mileage will very likely vary. If you're in an older house and know its electrical wiring isn't very reliable, then powerline-based networking obviously isn't the best route to take. But Netgear claims its kit works in homes as large as 5,000 square feet; try getting uniform wireless coverage in a house of that size. Underestimated though it might be, there's a strong case to be made for adding powerline to Ethernet-based networks that are unable to reach every room requiring connectivity. ▲

by Paul Cross



Vision, imagination, and dreams of millions of hardware enthusiasts are now the foundation of the new CM 690 II Advanced.



- CPU retention hole and Cable management
- A pure black coating
- Supports twin 240mm internal radiators
- Filtered inlets on top, front and underneath
- Blue LED on/off fan
- Tool-free ODD bay locking system
- Modular removable HDD bays
- Anti-vibration rubber feet
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www.coolermaster-usa.com

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microcenter.com
The Computer Superstore



TigerDirect.com

Home Network, Power User-Style

WE CONNECTED ANYTHING & EVERYTHING

Power users have power toys: a few desktops and notebooks, broadband connectivity, and even some network-aware components in their entertainment system. Making them all talk to each other can be a daunting task, but the right equipment makes it a snap. Figuring out what the right equipment is can take a lot

of time and research, but you're in luck: We happen to think researching this stuff is fun, so we've created the ultimate power user's home network just for kicks, along with some options some households may need. ▲

by Warren Ernst

The Wireless Router: Linksys WRT610N

A router is the brains of the network, and the WRT610N is the best there is on many levels. It supports Gigabit LAN speeds (with four 10/100/1000 Ethernet jacks) as well as 802.11a/b/g/n wireless networking on (count 'em) two wireless bands: 2.4 and 5GHz. The two radios let you separate traffic by type or let your data cut through the airspace noise that may be filled with other nearby wireless routers, so you'll get good range and speed from your laptop computers. Additionally, a built-in USB port lets you plug in a USB hard drive or flash drive for instant NAS.

For the ultimate flexibility, the WRT610N is compatible with DD-WRT and other open-source firmware, which opens up a lot of options. DD-WRT lets you create a public hotspot that's separate from your LAN: Set up a VPN to your home LAN for an encrypted tunnel, which lets you access your home LAN or your office computer in the event you forgot that crucial PowerPoint presentation, and use the built-in USB port as a print server in addition to network-attached storage. (Just connect a USB hub.) Plus, it has dozens of the kinds of networking tweaks that make power users go gaga, so we recommend you spend some time setting it up. ▲



WRT610N

Newegg Item#: N82E16833124296

\$139.99

Linksys

www.linksysbycisco.com

The Gigabit Switch(es): Trendnet TEG-S80G 8-port Gigabit GREENnet Switch

You might not need a Gigabit switch right next to your router if you don't have many desktop computers or wired Ethernet devices, but if you need more than the four Ethernet jacks that come on nearly any router, then Trendnet's TEG-S80G 8-port Gigabit GREENnet switches are what you want to get. The switches consume up to 70% less power than other switches by reducing power to unused jacks or jacks connected to short cables, remaining cool to the touch even under heavy use. They also allow for neat installations because the network jacks are on the back and the LEDs on the front. TEG-S80G switches also support jumbo frames for high speed.

Why might you need a second switch? Most new A/V equipment, such as your flat-panel TV, satellite/cable box, videogame console, and Blu-ray player, all come with Ethernet jacks to display Internet content. Why run four lines to your living room when you can just put a second switch in your A/V stack and plug everything into it with just one line? ▲



TEG-S80G 8-port Gigabit GREENnet Switch

Newegg Item#: N82E16833156251

\$37.99

Trendnet

www.trendnet.com

The Entertainment Device: Samsung BD-P4600

Samsung's latest Blu-Ray player not only plays Blu-Ray discs and DVDs, but it also connects to your Netflix, Blockbuster Direct, YouTube, and Pandora accounts to stream movies and music directly from the Internet. Plus, it can play your digital media directly from your LAN's shared drives. It even has a bundled Wi-Fi dongle if you can't run Ethernet to your living room. ▲



BD-P4600

Newegg Item#: N82E16882676137

\$299.99

Samsung

www.samsung.com

The Wireless Print Server: D-Link DPR-1260

Don't want to bother with adding DD-WRT to the router but have some USB printers you want to network? The DPR-1260 can network up to four USB printers, and its wireless radio lets you put the cluster of printers anywhere there's a Wi-Fi signal. Setup of supported printers is ridiculously easy, but even "unsupported" printers work with Windows' own TCP/IP port printing routines. ▲



DPR-1260

Newegg Item#: N82E16833127074

\$66.98

D-Link

www.dlink.com

The Powerline Networking: Netgear XAVB101

For the highest networking speeds for your living room's gear, you should really run just one Ethernet line through the walls to your living room, connect it to the Gigabit switch nestled among your A/V gear, and enjoy the speed. If you just can't do this, then powerline networking (which uses your home's electrical wiring for Ethernet) is the next best thing. It's more reliable than Wi-Fi and now delivers up to 200Mbps speeds (theoretically). Just connect the Gigabit switch to one of the modules plugged in next to your entertainment center to keep the cable clutter down. ▲



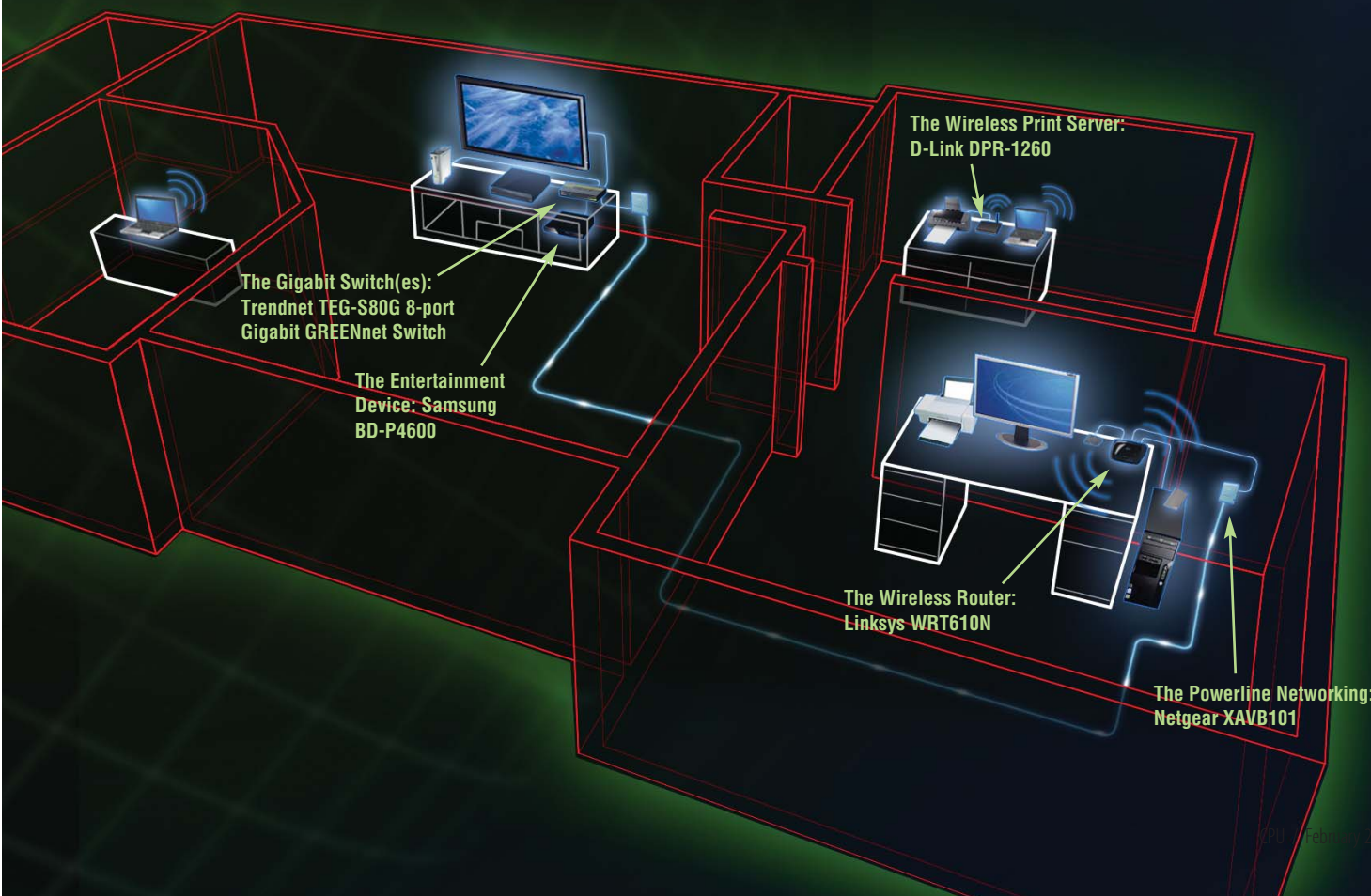
XAVB101

Newegg Item#: N82E16833122233

\$129.99

Netgear

www.netgear.com





The Bleeding Edge Of Software

Inside The World Of Betas

Google Chrome for Windows 4.0.249.30 Beta

We've grown somewhat used to the "beta" moniker for Google products (Gmail was in "beta" for years, after all), but the latest beta for Google's Web browser, Chrome, is something we're not used to seeing from Google: a beta product with a new revolutionary feature that's absent from the "normal" version. The latest Chrome beta has an extensions framework that lets programmers add modules to your favorite lightweight browser, more or less like what you're used to with Firefox. Extensions will transform Chrome from "the interesting browser you use to check out new things once in awhile" to "your daily browser," and we look forward to the transition.

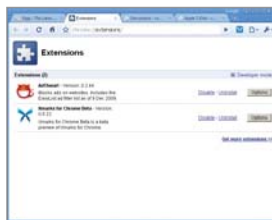
Although the extensions library for Chrome is fairly small (only about 300 at the time of this writing), there are some biggies. Adblock (or similar alternatives such as AdSweep or AdThwart) is perhaps the most eagerly anticipated extension.

Moreover, it highlights some of the differences in extension structure between Firefox and Chrome. Chrome extensions are generally written in JavaScript, and as such work with data after it's been downloaded rather than working with the raw data stream as Firefox extensions can. In the case of Adblock, the Firefox version is capable of actually stopping online advertisements from downloading from ad servers, which saves bandwidth and reduces page download time. The Chrome ad blocking extensions must allow the advertisements to download from their servers, but the Chrome extensions hide the ads

and re-render the pages as best as possible. On some pages, you can actually see the advertisements flash into existence for a split second as the page renders in Chrome, but the end result is an ad-free page.

Generally, Chrome makes much better use of limited screen real estate by doing away with status bars, title bars, and menu bars (netbook users rejoice!), and its rendering engine is fast and efficient. It possesses lots of power user-friendly little features that reflect its "clean sheet" approach to browser building. Now, Chrome is not only worth a look but also worthy of being your default browser. ▲

by Warren Ernst



Google Chrome for Windows 4.0.249.30 Beta

Publisher and URL: Google, www.google.com

ETA: Q2 2010

Why You Should Care: With extensions, Chrome may change the Web browser game.

HijackThis 2.0.3 Beta

There are plenty of automatic tools for removing malware from your PC, but there are times when a truly skilled eye and a powerful manual tool are needed to clean out stubborn infestations. Time and time again, the experts call upon HijackThis, mostly because it is fast and free, but it has other features that are real time savers when dealing with nasties in the machine.

HijackThis is a small executable that works well from a thumb drive and can be renamed as necessary to foil malware that's smart enough to try to kill the application whenever it is seen. After launching HijackThis, just click the scan button and review the list of everything (and we mean everything) that automatically executes on your computer, including startup programs, services, browser helper objects, and more. If you've been in the PC cleanup

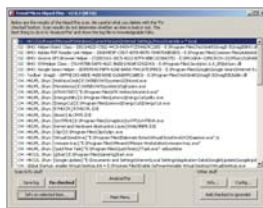
game for a while, check the items you know to be malware and click the Fix Checked button; HijackThis clears them out. But be careful, because you can also opt to remove something that's either benign or very necessary, screwing up the machine you're trying to fix. Thankfully, HijackThis has a multilevel undo feature.

HijackThis includes other handy tools. There's a Delete A File On Reboot option for deleting locked or in-use files. There's a process manager that works like a streamlined Windows Task Manager, a Hosts file

editor, an Alternative Data Stream scanner to look for rootkit-like behavior, an NT Service deletion tool, and an Add/Remove Program list editor to remove or edit orphaned or broken uninstallers.

Perhaps the biggest reason to use HijackThis is because it is the *de facto* tool for generating logs to let experts analyze in most PC troubleshooting forums. Generate the scan log and paste it into your favorite forum. Before long, you'll have someone offering insight on what's troubling your computer. ▲

by Warren Ernst



HijackThis 2.0.3 Beta

Publisher and URL: Trend Micro, us.trendmicro.com

ETA: Q2 2010

Why You Should Care: Possibly *the* program for cleaning out malware by hand.

UP TO SPEED

Upgrades That'll Keep You Humming Along

This month, we cover updates for an eclectic range of high-end hardware (PS3, Xbox 360, Palm Pre) outside of the desktop environment. Some old standbys such as SiSoft Sandra and WinRAR receive updates, too.

Software Updates

Adobe Air 2 Beta

Adobe's online and offline application development platform is aiming for a major update. This developers' beta lets programmers play with multitouch support. Other improvements include mass storage device detection and improved security. Air 2 can now recognize the application you have assigned to open given file types.

labs.adobe.com

Camino 2

This alternative to Safari and Firefox browsers for Mac OS X now has enhanced tab browsing, with an at-a-glance overview of all open tabs as well as tab rearranging. Phishing and malware protection are now baked into the browser. It also can easily block Flash animations and pop-ups.

caminobrowser.org

J. River Media Center 14.0.106

The multimedia player and library adds more UPnP options as well as mimetype support for DNLA devices, such as the PS3, letting them play MP4/M4V files without transcoding. A previous update, 14.0.105, added more text formatting control in the media notes section and changed the way notes are stored (now as HTML rather than XML).

tinyurl.com/ya7rzc

McAfee Labs Stinger 10.0.1.6888

This dedicated tool for finding and removing specific viruses will often clean out an already sick system, although it isn't a full antimalware suite. This

update brings the profiles up-to-date (to Nov. 23, 2009) for handling "all know variants" of the major strains Stinger combats.

vil.nai.com/vil/stinger

Donationcoder.com Screenshot Captor 2.77.01

This unobtrusive screen capture tool has loads of autonaming and customization controls. Full support for scanner acquisition and image correction are included in this version.

www.donationcoder.com

SiSoftware Sandra 2010

The classic system diagnostics and analytics tool adds support for a range of virtualization technologies for better use on servers. The new version runs better on Windows 7 and Vista; it also adds DirectX 11 support. Win7 system reports now detail temperature, fan, and voltage sensor information.

www.sisoftware.co.uk

Trend Micro RootkitBuster 2.80 Beta

This free, dedicated tool from security software maker Trend Micro seeks out the rootkit invaders that manipulate operating systems. This version enhances the detection of "mebroot," which can attack a system's master boot record.

www.trendmicro.com

WinRAR 3.91 Beta 2

The compression tool for unpacking RAR files fixes crashes that occurred when handling some TAR.BZ2 archives or when testing corrupt CAB files. It also fixes a problem from the previous beta related to the progress bar. Beta 1 added the ability

to decompress 7-Zip archives that were created with LZMA2 algorithms.

www.rarsoft.com

Driver Bay

Boot Camp Drivers Update 2.2 For Windows

This update fixes problems with the Apple trackpad and adds support for the new Apple Magic Mouse and wireless keyboard. Apple warns it is designed only for installing your own versions of Windows XP or Vista.

www.apple.com

Nvidia GeForce/Ion Release 195.62

The WHQL-certified drivers for most GeForce cards add improved GPU support for Flash 10.1 HD video playback; support for the GeForce GT 240; and new SLI and multi-GPU support for Borderlands, Call of Duty: Modern Warfare 2, FIFA Soccer 10, and others.

www.nvidia.com

Palm Pre WebOS 1.3.1

Palm's new mobile OS receives a couple of changes to its backup routine. You can now restore browser cookies but not online account passwords. WebOS can now search for contacts across multiple Exchange accounts.

www.palm.com

PlayStation 3 Firmware 3.10

Most notably, this update to the PS3 lets you tie your PlayStation Network account to your Facebook account. The improved Photo gallery can display more images from your library at a time.

www.us.playstation.com

Xbox 360 Dashboard Fall Update

Like the PS3 update, social networking support is a major component of this update to the 360. Xbox Live now integrates Facebook and Twitter, and Internet radio provider Last.fm is included, too. A new Zune Marketplace offers HD video streaming.

www.xbox.com

by Steve Smith

The Cloud Comes Home

Exploring Tomorrow's Apps Now

Regardless of how we define “cloud computing” as it relates to consumers, we can agree on two things. First, this is a fledgling field starting to fill up with novel, next-gen apps. Second, cloud computing is no 15-minute fad. The tech companies that control computing—Microsoft, Google, Amazon, EMC, and so on—have invested untold billions in developing the resources for tomorrow’s cloud-based applications, whatever they may be. “Cloud” is where the world is going, and it’s about to significantly reshape how each of us thinks about and interacts with computing.

What can you, at home, do with cloud computing today? We did some flying around to find out.

Google Apps



Any dive into consumer cloud applications should probably start with the most influential name in the field: Google Apps. Officially, “Google Apps” refers to a suite of cloud-based services meant to offer similar functionality to traditional office suites, including email (Gmail); word processing, spreadsheets, and presentations (Docs); scheduling (Calendar); and Web site creation/hosting (Sites). These apps can all be used in a standalone fashion, but collectively they’re known as Google Apps Standard Edition. Standard Edition is free for groups of up to 50 users, and it’s meant to hook people on cloud-based collaboration.

Google Mail (Gmail) started racking up millions of subscribers in 2004 thanks to its then-humongous 1GB of email storage; at the time, most competitors offered 20MB or less. Today, the service offers well over 7GB. Additional storage can be

leased annually, starting with \$5 per year for 20GB, and this capacity is shared with photo storage for Google’s Picasa Web Albums. Gmail also gained popularity for its searching capabilities and excellent spam filtering. More recently, Gmail has integrated chatting (including AIM and SMS messaging), a task list tool, and offline operation via Google’s open-source Gears. Cell phone users can use Gmail Mobile, and push mail capability is now

(PDF, RTF, DOC, HTML, CSV, and more—including the newer XML MS Office formats), you can share folders with other Google users. The power of Docs comes from being able to edit files on the cloud either individually or in a group effort, with multiple users working on the same file(s) simultaneously. You can also create new word processing documents, presentations, spreadsheets, or forms either from scratch or

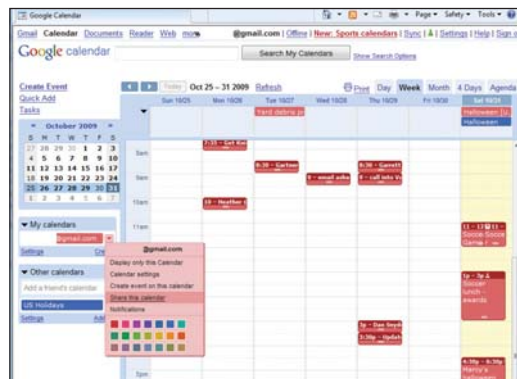
an array of templates from within your browser. Installing Gears will let you work with Docs while offline.

No, Google Apps isn’t going to unseat MS Office anytime soon. These are comparatively rudimentary tools that will run substantially slower than local apps because of Web-based latencies. On the other hand, Google Apps aims to cover the 80% of productivity functionality constantly needed by the vast majority of users, integrate with conventional desktop apps, and then enable better collaboration

than is available anywhere else in the consumer space. In this, Google succeeds brilliantly. Apps isn’t perfect, but the suite is easy, free, and allows us to work in ways we never could before.

Microsoft

At its simplest, Windows Azure is a platform for running Windows apps and storing their data on Microsoft’s incredibly vast cloud infrastructure. You might think of Azure as a huge, empty, immensely scalable mall waiting to be filled with every conceivable type of business, including many that have yet to be invented. Microsoft’s Live Services (see



Google Calendar can not only sync in appointment data from Outlook but also be shared with others, such as family members and colleagues.

available for iPhone, Symbian, and Windows Mobile.

Google Calendar is a straightforward time planner with task list capabilities. You can choose from a long list of other calendars to integrate into your own, such as holidays in other countries, various sports, birthdays of people on your contacts list, and so on. Calendar also supports synchronizing with various other apps (most notably Outlook and iCal) and smartphones.

Google Docs is today’s gold standard of consumer-level document collaboration tools. Not only can you store and view files saved into a variety of formats



Microsoft's Xbox Live service now supports Netflix's Watch Instantly content, including a small but growing bed of HD content.

below) run on top of Azure. However, by 2008, Microsoft's work in cloud computing had already gone through years of evolution. Perhaps the earliest and most famous of these was Xbox Live, which started running from cloud resources scattered around Washington state in 2002.

Xbox Live



Either you use Xbox Live or you don't, and if you use it, you probably love it. Numbers from the early part of this year showed Sony's PlayStation Network with 20 million users compared to 10 million on Xbox Live, but Microsoft was blowing Sony out of the water on per-user revenue. In terms of sophistication if nothing else, the Nintendo Wi-Fi Connection service for Wii comes in a very distant third.

These online services allow for Internet-based collaborative gaming, messaging among a circle of opt-in friends, and downloadable content. Microsoft and Sony go further, providing TV and movie downloading, achievement tracking, and (via Last.fm on XBL) streaming music.

In addition to Last.fm, Xbox Live has added Facebook and Twitter integration. As part of the service's Video Marketplace now transforming into "Zune," users will also get live IPTV from British broadcaster Sky as well as nearly instant 1080p video streaming. Last season's inclusion of

Netflix Watch Instantly is starting to look downright quaint. Other XBL niceties, such as branded avatar customization and being able to join friends in group movie parties, sweeten the experience further. The XBL interface is ultra-intuitive, and glitches run few and far between if your LAN connection is solid.

Sony is Microsoft's only real online console competition, but Sony doesn't have anything like the Azure platform or the ability to dovetail PSN with the operating system deployed on more than 85% of the world's PCs. The deck is clearly stacked in Microsoft's favor and only seems to grow more so with each passing month. Why doesn't Microsoft care about supporting Blu-ray on the Xbox? Because Zune wants to devour physical entertainment media, and, with all of these extra entertainment services hitching to its platform, it can. This is one example of the radically transformational effect cloud computing may have on everyday life.

Windows Live



"Windows Live" can mean just about anything Microsoft wants. There's Xbox Live, which is cloud-based, and Games for Windows Live, the online gaming service

for PC games that shakes hands at some points with Xbox Live. Early Windows Live titles were more or less ports of MSN titles, and some of the current Windows Live Essentials titles, such as Messenger and Movie Maker, were simply ripped out of Windows and turned into optional downloads.

Some Windows Live Essentials apps are not cloud-based, although they do have hooks into other cloud-based entities. For instance, Windows Live Photo Gallery is what Paint should have been, complete with people tagging and panorama stitching. The app runs locally but lets you upload to Windows Live Photos, Microsoft's online photo service that integrates across multiple Live tools. Writer helps you compose blog posts locally for uploading to several different (cloud-based) blog services, including Windows Live. This may all seem a bit simplistic, but it actually mirrors the hybrid cloud strategy gaining popularity in the enterprise world. Not everything is expected to become cloud-based, only a big chunk of



Microsoft's data center in San Antonio, Texas, is one of the company's massive complexes fueling today's wide range of Live cloud services.

everything. The degree to which a service provider can make the local and cloud aspects of a platform seamless is expected to play a big role in which services succeed or fail.

Windows Live Essentials applications don't offer much that's particularly new, but at least the apps are free, Microsoft is generous with its resources, and the tools are needed by a broad selection of consumers. A lot of people want a place to

throw together a basic Web page with nearly point-and-shoot simplicity—that’s Windows Live Spaces. A lot of people want a big “hard drive in the cloud”—that’s Windows Live SkyDrive, with 25GB of free storage. The GUIs across all of these apps are generally simple and effective.

The real point with Windows Live is to get your personal data (contacts, videos, documents, MP3s . . . everything) into Microsoft’s cloud. It then falls to Microsoft to come up with nifty ways to make this data more convenient and ubiquitous. Thus, we have Windows Live for Mobile, which repackages many of the core Windows Live apps (Hotmail, Messenger, Photos, Spaces, etc.) to run on today’s top phone platforms, including Windows phone, BlackBerry, Nokia, and, yes, even iPhone. Piece by piece, we’re starting to see integration with Xbox Live. It seems more than likely that all of these various “Live” platforms will become transparently fungible.

There’s no question that, from a desktop application feature perspective, today’s Windows Live apps are underpowered. There are cheap or free desktop equivalents that are far more robust. (Think GIMP vs. Photo Gallery.) But look at where Live was three years ago, then where it is today, and extrapolate to three years from now. Power users might chafe at some of the “dumbed down” functionality, but the masses will eat it up and beg for more.

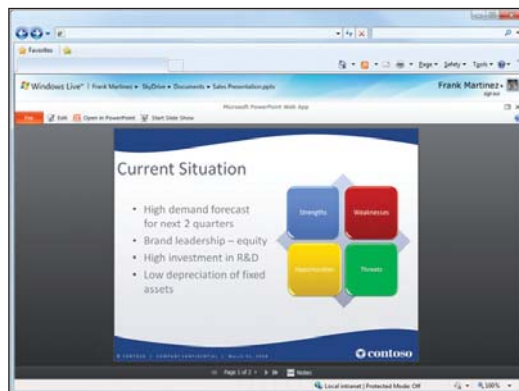
Live Mesh



As the name implies, Live Mesh ties together multiple computing devices, including Macs and smartphones, and binds them to a virtual desktop (“Live Desktop”) backed by a 5GB virtual drive in the cloud. Each device has its own ID, and your Live ID is effectively the One Ring that binds all of these entities together.

There are several ways you can approach Live Mesh. If nothing else, it’s 5GB of free cloud storage you can tap from anywhere. Simply head to www.mesh.com and click the Desktop button at the top of the UI to access your Live Mesh virtual desktop and

its folder collection. Back on the Devices ring, you can also click the Add Device symbol and opt to install the Live Mesh client software in either XP/Vista-32, Vista-



Office Web Apps will soon enable a free if feature-limited spin of Word, Excel, PowerPoint, and OnePoint, offering Google Docs its first serious competition.



The Live Mesh Devices UI couldn’t be simpler, with the Live Desktop offering two-click access to 5GB of cloud storage.

64, or Mac flavors. When the software is done installing, your system will appear on the Devices ring.

When you’ve installed Live Mesh on more than one system, you’ll be able to use Live Mesh as a remote desktop vehicle. Simply click the target system on the Devices ring and click Connect. This initiates a remote desktop session in the vein of Citrix GoToMyPC, wherein you’ll have total remote control over the system, including the ability to issue CTRL-ALT-DELETE commands and make Control Panel modifications. There’s no out-of-band control yet (when the system is off or the OS is unavailable), but you don’t have to look beyond Intel’s vPro platform to see that this capability is within reach.

Our favorite feature is being able to go into My Computer, right-click a folder, then select Add Folder To Live Mesh. This creates a duplicate of the folder in your

Live Mesh desktop and starts synchronizing the two. Right-click the folder again and choose Live Mesh Options. From here, you can change the sync settings between all other devices in your mesh, invite members and friends to access your folder, and manage those members. Your files are suddenly everywhere you need them to be. As soon as you save or modify a file in a Mesh location, that file is automatically synced to every approved device, including the Live Mesh desktop.

Compared to a purely local file system, Live Mesh still has a long way to evolve. A 50MB upload might take five or 10 minutes, during which you can’t initiate any additional uploads. In fact, you can’t do anything else in Live Mesh without canceling the upload. On the client side, Mesh still behaves like an application doing one thing at a time, and we’re peeved that Mesh can’t link to SkyDrive yet—5GB doesn’t get you very far.

Still, this is the best and broadest synchronization implementation we’ve seen to date in

the consumer world. Clearly, Microsoft’s willingness to embrace non-Windows platforms within Live Mesh signals the long-term truth: The client operating system will become increasingly irrelevant as the infrastructure connecting devices becomes the new axis of control.

Microsoft Office Web Apps

Not Yet Rated

Office Web Apps is Microsoft’s cloud-based implementation of Word, Excel, PowerPoint, and OneNote. As of this writing, Office Web Apps was in invitation-only testing, and we were unable to get hands-on inclusion in the program in time for review here. Nevertheless, enough other people have posted



Element V, a super full tower chassis, comes with full arsenal of cooling power that enables it to handle all of today's most high-end CPU and graphic cards available such as Intel Core i7 or latest ATI Radeon HD 5800 & 5700 Series graphic cards. Once the chassis is opened, one will immediately notice the full-array of oversized cooling fan that are strategically positioned to achieve maximum cooling efficiency. Ultra-silent 200mm LED exhaust fan on top and 230mm LED side panel intake fan work in perfect harmony to accelerate heat removal. Two 120mm intake (one with LED) fans, each located on the front of two 3-bay HDD cages to ensure valuable data stored are properly cooled. Thermaltake's proprietary Colorshift control enables real-time fan speed adjustment as well as various different lighting effects. Native 2.5" disk drive mounting also enables support for the advanced 2.5" Solid State Disk drives. With features so advanced, one may easily think that this chassis is from out of this world.

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observations for us to know several things. First, Office Web Apps will not offer all of the functionality found in traditional, client-side Office apps. Also, the current technical preview contains many bugs and feature omissions that will be remedied later. Finally, it seems obvious that Office Web Apps will feature a more attractive UI than the field's incumbent, Google Apps, but Office Web Apps may end up with the superior collaboration implementation. It's just too early to know.

For those who want a decent, free cloud-based personal productivity suite that doesn't add to the twin megaverses of Microsoft or Google, try Zoho (www.zoho.com), an impressively full-featured apps collection that offers various plug-ins for MS Office.

Storage

MozyHome



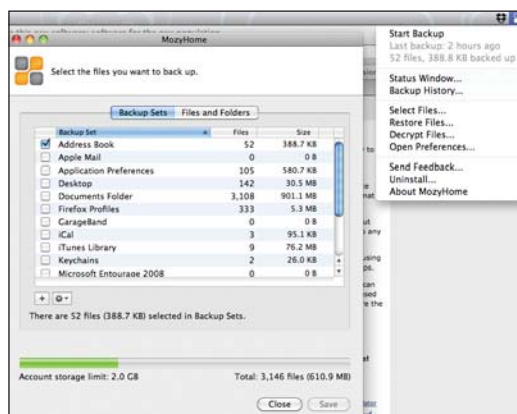
There are several excellent players in consumer cloud storage already. Carbonite (www.carbonite.com) reports having backed up more than 25 billion files since opening in 2006. Fabrik's Ultimate Backup (www.fabrik.com), now owned by Hitachi, is only pennies away from Carbonite's service at \$4.95 per month. But this is a tough space. Agonizing downtimes and other issues managed to kill off HP's Upline backup service in less than a year—and HP sells data center infrastructure.

A handful of providers will probably seize most of the cloud storage market. The question then becomes what these providers will do to keep your business and expand the ways in which you can use your data. One such service provider is Decho (formerly Mozy), purchased by EMC in 2007. The company now has more than 1 million users, representing more than 15 petabytes of data.

To get your feet wet, go to www.mozy.com and sign up for the 2GB free account in order to get the very friendly MozyHome Remote Backup

client for either Windows or Mac. The freeware will only scan your C: volume, and 2GB is hardly enough to back up video of your cat's antics, but at least you'll see how Mozy works. Upgrading to an unlimited, \$4.95 per month account is straightforward if you're ready to leap.

The first time you try to perform a backup, Mozy will run an upload speed test on your broadband connection and then inform you how many megabytes



MozyHome, shown here with a 2GB free account, offers secure cloud-based storage through a simple client UI. For less than \$5 per month, you can have unlimited storage.

you should expect to transfer in a 24-hour period. Don't be surprised if your reported speed is a fraction of what you expect. Our 5Mbps upload link reported only 484Kbps in Mozy. This is typical with online backup, and you can adjust it upward a bit with sliders for CPU utilization and bandwidth throttling. At top performance settings, we saw CPU utilization go from 25% to 30% at idle to spiking in the 90% range during encoding and transfer, so set your sliders cautiously.

You can add up to five additional PCs for \$4.95 per month each, and signing up for a year gets you one month free. There are limitations, of course. MozyHome won't back up system or application files or network drives, but once you have the Unlimited plan, you'll be able to back up any drive that shows up in the Hard Disk Drives area of My Computer.

There are several methods for restoring data with MozyHome. You can select the files or folders you want in My Computer

and click the Restore Files button.

There's a similar process via a Web-based tool. Mozy even offers GoBack-like versioning, and incremental Mozy backups can be set according to maximum number of times per day, minimum idle time, and maximum CPU load. It's all irresistibly simple, effective, and cheap! The only real drawback is that Mozy can't perform bare-metal backups a la Acronis True Image or CMS BounceBack Ultimate.

Obviously, Mozy is practically giving away the backup service to keep you around for future offerings, but for now, this remote service is too good to miss.

Mobile

Palm Synergy



When the Palm Pre phone arrived a few months back, it came with a new operating system called webOS and a feature called Synergy. Synergy is an information assimilator; you can pull data from such sources as Facebook, Gmail, iCal, LinkedIn, Outlook, and Yahoo!, and Synergy will fold them into a unified contact and calendar system. It groups conversation threads by contact rather than by communication app, so you can see all email, IMs, and SMSes to John Q. and get together under a chat-type UI rather than bouncing around in three apps.

Once Synergy has collated your various accounts, it records parts of this information to your Profile on Palm's cloud. Apps you buy through Palm's app store are registered in your Profile. Your login credentials for supported services (email, Facebook, Photobucket, etc.), contacts, memos, tasks, and calendar events are all backed up through your profile. In the event that your Palm phone (meaning the Pre or Pixi at this point) is lost or stolen, you can log in to your Profile from any Web browser, wipe/brick your old phone, replace it with a new unit, then restore all of this backed-up data, including app store purchases, from Palm's cloud.

Unified communications is a great idea; that's why we've been fans of apps such as Trillian (an IM uber-client) for years. Palm's choice to implement a

cloud-based backup is a step in the right direction. There's no more need to be dependent on a local HotSync connection or worrying about which PC has the "right" PIM data. On the other hand, Palm's implementation is only one piece of a full cloud solution.

For instance, Palm Profiles do not back up your messages, only your email account access credentials. If you have to restore a phone, you're only going to retrieve as many messages as are left on the mail server—usually only a day or two. In contrast, the Gmail/Android model is far more elegant. The phone is merely a conduit for Google's cloud, always synchronizing. In fact, you can start a message on an Android phone, save it as a draft, and finish sending it from a Web browser. That's how seamless cloud apps should be, where the device being used is somewhat transparent and irrelevant.

Palm wants its webOS and Synergy to be the glue that sticks third-party services together. Microsoft and Google can easily offer that glue with their own clouds, but why just be glue when you have the services and data centers to control the entire experience? On this count, Palm is already in trouble, and it makes one wonder if titans such as Apple, Nokia, and Research In Motion can maintain their global standing without next-gen cloud infrastructures in place to complement their mobile devices.

Personal Finance

Mint

Mint is a Web-based personal finance service—essentially Quicken from the cloud. (In fact, Quicken owner Intuit purchased Mint in September.) It's free. It's cool. It involves you supplying your financial account login credentials, email address, password, and ZIP code. The process is respectably anonymous and appears to be just as secure as any major online banking platform. If this doesn't sound secure enough for you, though, stay away.

Mint's top function is to aggregate the information from your many financial accounts (checking, investment, credit, etc.) into a single, consolidated interface.

Quicken and MS Money have done such tasks for years, but they're client-based tools, so if you're away from the system on which they're running, you've got nothing. Mint stores and analyzes your transaction data, so if you prefer to use cash for everything, then Mint won't be as beneficial. Still, most people never tally up or track their net worth. They have no idea if they're going more into the black or red every month or where their money is going. This ignorance is one of the leading factors behind personal financial distress. Mint's job is to help reduce that stress in a way that's easy and painless.

As with Quicken and MS Money, you'll need to go through an initial period of teaching the tool and learning what it can't do. For example, if you pay your insurance premium every six months, Mint is going to show you under your insurance spending budget for five months and way over budget on the sixth. It may log your espresso spending at PerkyBeans as automotive repair until you teach it otherwise. If you get an auto tune-up on the 30th and it doesn't post until the 2nd, your budgeting for both months will be skewed. So Mint has limits.

But Mint can tell you what other people are spending for given items in your locality. It offers an extensive selection of alerts in areas such as budgets and pending bill payments. You get lots of pretty, informative graphs. We like Mint most of

all because, as cloud apps should, it consolidates resources and lends some ubiquity to tasks that have traditionally been desktop-bound. There's currently a Mint iPhone app, a Yahoo! plug-in, and we hope more platforms will follow soon.

Storm Front Rolling In

Cloud applications make it easier and more cost-effective to share resources. We simply tap into the same data from whatever device we happen to be using, and that data gets manipulated differently depending on the device. Doesn't it seem likely that when, in the near future, you buy a game that you'll actually be licensing the right to play that game across many device types and interfaces rather than the old model of purchasing one license for each device and not being able to have your accomplishments on each device tracked through a central service?

This sort of change is how cloud computing will impact us all. Is there any doubt that the entertainment industry is desperate to embrace a cloud model in which traditional piracy becomes increasingly less desirable? Look at Netflix's Watch Instantly and imagine having more HD content on demand for pennies than anyone could consume in a decade. You can't pirate a game when it runs on a remote data center. You can't rip BD-Live content. Moreover, if you love adopting new technology, then the cloud is your friend.

"Even going back five years, there wasn't much you could do online other than get information," says Forrester Research Principal Analyst Ted Schadler. "But now, we have this explosion of capabilities via cloud computing. If you want a service, something you are trying to get done, this is how you'll do it from now on. Technology-enabled services will always enter the market in this way, forever. You, the consumer, are and will remain at the cresting wave of the cool, new stuff. You'll get it first." ▲

by William Van Winkle



Mint's cloud-based personal finance application can help people understand their spending habits and budget their way into wealth—not bad for a free tool!

Phoenix Technologies Phoenix Freeze

Do you always lock your computer before you walk away from it? Or are you an energy-conscious person (or want to become one) who always turns off your monitor and puts your PC into Sleep mode when you're not in front of the computer? Phoenix Freeze is an application that takes advantage of the Bluetooth connection on a BlackBerry or iPhone to let you do any of the above just by taking your phone with you when you leave. Step back into the range you set, and the PC will automatically unlock and awaken.

As of press time, Phoenix Freeze worked with Windows XP and Vista, but Phoenix told us that Windows 7 and Mac releases were on the way. To install Phoenix Freeze, you'll just need to download the installation file to your WinXP or Vista system. Phoenix advised us to turn on the Bluetooth connection on our test PC and mobile phone (we used both a BlackBerry 8820 and iPhone 3G) before installing

the software, because the application immediately checks for Bluetooth availability. In fact, we discovered that Freeze would not start until the computer's Bluetooth connection was active and in Discovery mode.

After you pair the application with your mobile phone, you can choose whether Freeze merely locks your PC or if it also turns off your monitor or puts the computer to sleep. Freeze lets you customize both the lock and unlock proximity ranges, as well as time it takes to switch on or off. For the most part, Phoenix Freeze worked well in both of our tests. But occasionally, when we walked away from the computer, Freeze didn't lock it. The issue was intermittent (happening only about 5% of the time, but we could see the problem becoming annoying over time). Additionally, the inconsistent performance may not be ideal for a program that's designed to lock down your PC.

Still, this is a decent app for people who want to lock or sleep their hardware. ▲

by Nathan Lake



Phoenix Freeze

\$14.95

Phoenix Technologies

www.phoenixfreeze.com



Avanquest Software Double Anti-Spy Professional 1.4.4.4

It's pretty rare to find an experienced user's computer infested with spyware, and this isn't an accident. Most (though admittedly not all) spyware comes from Web sites that just *feel* a little fishy somehow: The products these sites want you to download have funny names, icons and fonts seem ripped off from other Web sites, and the "companies" behind them are either unnamed or some outfit you've never *ever* heard of.

We mention this for a reason: An antispysware product's main goal should be to protect inexperienced or casual computer users from spyware without throwing a lot of technical jargon at them, and without expecting a novice user to be able to answer questions correctly. With this in mind, we find Double Anti-Spy Professional wanting. It more-or-less works when its operator is experienced but will easily fail in the hands of a novice.

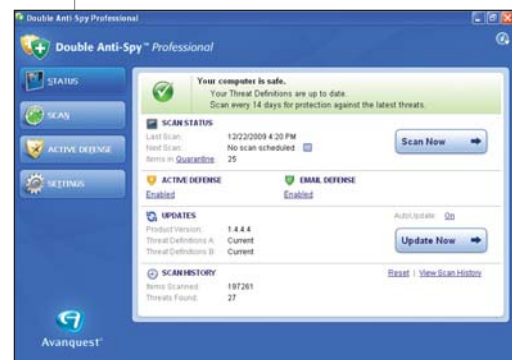
DASP touts two different antispysware "engines" (hence the "double" in

its name) running under one GUI. One is more definition-based, and one is more heuristic-based. The idea is that if spyware gets past one engine, the other will block it. DASP works in real time, always monitoring the system for spyware rather like an antivirus product, popping up warnings when "an unknown program is attempting to run."

The problem is that DASP displays the full path of the item (usually a cryptically named file running from a temp folder) and other technical information, presenting a Block and Allow button. The engines don't name or identify the spyware, or even call it "spyware." And DASP doesn't take automatic action or even recommend the action of Block. In short, DASP's pop-up offers no guidance; in the absence of guidance, novice users can be counted on choosing the incorrect action often. And then the spyware is in.

DASP has a manual scanner, too. It works pretty well, but not quite as well as the free Malwarebytes' Anti-Malware. Though attractive and easy to use if you're experienced, DASP misses the mark for its target audience. ▲

by Warren Ernst



Double Anti-Spy Professional 1.4.4.4

\$29

Avanquest Software

www.avanquest.com



Open Sores

Exploring Ubuntu, Part 4: Peripherals, Virtualization, Conclusions

Our journey through Ubuntu over the last few months has come to an end. This month, I examine the stickiest of Linux wickets—namely, support for devices—and discuss how virtualization software can help (or not help). After all, regardless of how much handy software you can get your hands on, at some point you need to connect some hardware to your computer, be it a printer, digital camera, mouse, keyboard, or something else. For that, getting software that isn't found in a software repository to work can be a daunting task, as well.

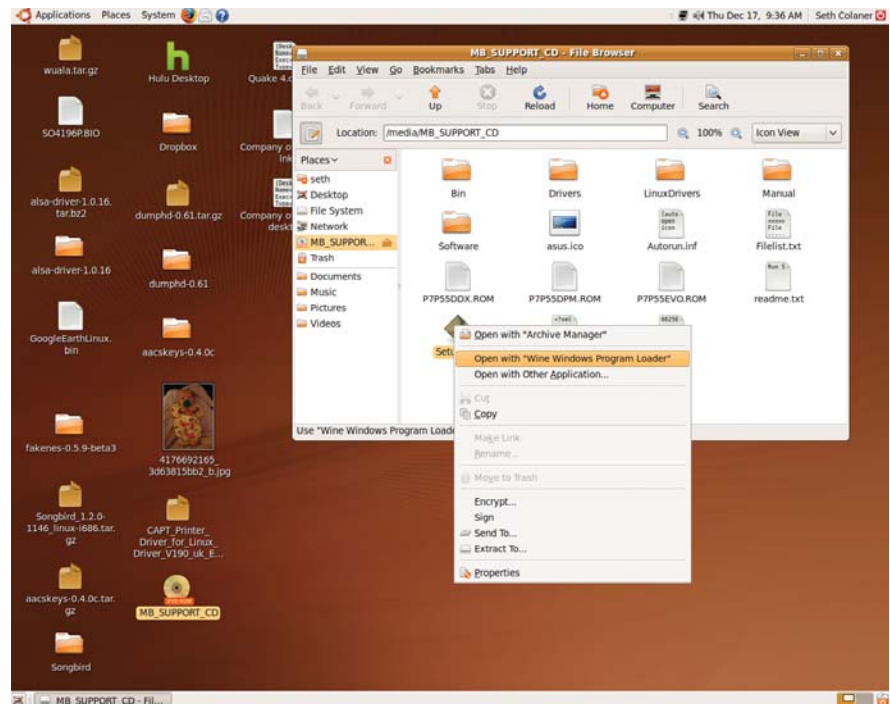
Device Support

Support (or the lack thereof) for devices and drivers is an issue that can drive people absolutely nuts. Linux distributions have a dubious reputation in this regard, and, apparently, that distinction is well earned.

Although I was able to plug in some devices, see that Ubuntu recognized them, and use them right away with few or no extra steps required, others were more problematic. For example, I connected a digital camera, opened it with the default program (F-Spot Photo Manager), and imported the photos with no problem at all. However, I also tried in vain to get a printer to work at all.

After some digging, I discovered that my brand-new printer simply wasn't supported. The manufacturer didn't provide any Linux drivers, and there is no work-around. I have a new printer and a computer with a fresh OS distribution, yet they are incompatible.

This is a common problem. When you want to connect a device to your Linux computer, you have no idea whether the computer will recognize it, and, even if it does, whether the device will have full functionality.



Wine is a tool that lets you run Windows applications natively within a Linux environment; no additional operating system is required.

There are forums where you can determine which devices are supported by your Linux distribution, but you don't always have the luxury or foresight to purchase a supported device. There is a huge community of Linux users that can help you solve problems you encounter, but sometimes—as was the case with my printer—there is simply no help to be had.

What is one to do in such a situation? If you can't find a solution or work-around to a driver issue, your best bet is to turn to virtualization software.

Virtualization

Virtualization software enables you to run non-Linux (typically Windows) applications or entire operating systems within Linux. Frankly, virtualization software is brilliant, and it circumvents a lot

of the compatibility headaches that Linux users face.

One of the better-known virtualization tools is Wine, which is available under the Add/Remove software repository in Ubuntu. Wine is unique among virtualization tools in that rather than letting you run one complete operating system within another, it lets you launch specific applications. For example, with Wine installed, if you want to run a Windows-only application, you can just right-click the application and select Open With "Wine Windows Program Loader."

Although it continues to improve, the downside of Wine is that not every Windows application is supported. In fact, each application's APIs must be re-created by hand in order for it to run with Wine, which is a process that simply takes developers

Ubuntu supports some devices with no problem, while others are simply inexorably incompatible.



time. The more popular Windows applications, such as Microsoft Office, enjoy the most complete support, but if you have a lesser-known program you're hoping to use, you're probably out of luck.

The upside of Wine is that it lets you run unsupported programs in Linux without resorting to virtualizing another operating system. Plus, it's free.

There are others, but Crossover (which is based on Wine) and VirtualBox (also available in the Add/Remove repository, incidentally) are two robust virtualization tools. If you have a license for an operating system such as Windows XP, you can install it as a virtualized computer and run applications from it. For example, if you just can't live without Microsoft Excel, you can run it in your virtualized Windows instance, provided you have the requisite software license. Or, more importantly, if you need to install your device's drivers in Windows to get it to work with your machine, virtualization is a godsend.

At first blush, the solution to hardware compatibility problems with Ubuntu seem like they could be solved by using virtualization software. However, Wine has gaping holes in its support (just try and run your favorite DX10 game as a Wine instance, for example), and other virtualization software requires you to purchase another operating system.

Therefore, although virtualizing applications or operating systems can help you solve quite a few problems in Linux, the tools to do so either leave something to be desired (as Wine does) or cannot free you from the bounds of a proprietary operating system. Sure, they'll perhaps help you get

your device to work on your computer, but there's the rub: Although you've gone to the trouble of ditching your Windows PC and switching to a free operating system, you haven't escaped Windows at all, which effectively defeats the purpose of switching operating systems in the first place.

Conclusions

For the last few months, I've been exploring Ubuntu from the perspective of someone who's tech-savvy but knows next to nothing about Linux. It's been an educational experience, to be sure.

Predominantly, my goal was to discover to what extent I could use Ubuntu (purportedly the most user-friendly of all Linux distributions) without any extra effort, such as using the Terminal or scouring the Ubuntu forums for advice on how to get this software or that device to work. The results were mixed.

The things that Ubuntu does well, it does extremely well. The interface is clean, attractive, and delightfully simple to use. Virtually anyone who has spent any time in front of a computer can figure out how to use the Web browser, check email, create Microsoft Office-type documents, and even install applications in Ubuntu. But the issues that have historically plagued desktop Linux distributions, such as the inability to support many proprietary formats and lack of device support (without resorting to a virtualized proprietary operating system) prevent even Ubuntu from being a completely useful operating system. Even the most experienced users will find that some things are just not possible.

That said, the importance of Linux to the world can hardly be overstated. Linux extends far, far beyond the bounds of the desktop and can be found underlying an increasing number of devices and computing systems, from smartphones to vast swaths of the IT industry to supercomputers used for important research. That's why the term "Linux-based" is such a welcome one in the computing world; there are many systems that run on Linux but require no behind-the-scenes meddling by the end user. Android is a good example; even the Mac operating system is built on the foundation of Unix, after all.

However, in recent years, Linux on the desktop has been increasingly touted as a viable alternative to Windows and Mac, but in that regard it falls woefully short. In order for a desktop operating system to be usable by the average computer user, everything needs to "just work" as much as possible with as few hiccups as possible. One simply has to look at the increasing popularity of Macs and the widespread dissatisfaction with Windows Vista to understand that.

Don't get me wrong: If you're a power user or just like to tinker with your computer, Linux is a blast, and Ubuntu is a great distribution to cut your teeth on. In fact, I posit that learning how to use Linux at least nominally well should be required of any serious computer user. It will open your mind to the possibilities of computing and highlight the shortcomings of proprietary operating systems, but Linux has not yet reached the point where it can completely replace your Windows or Mac machine.

Need a litmus for whether or not Ubuntu is a satisfactory alternative? Think for a moment about trying to support a new computer equipped with a Linux OS that you bought your grandparents. The first time you hear yourself say, "OK, open the Terminal. . ." over the phone, you'll know. ▲

by Seth Colaner

The upside of Wine is that it lets you run unsupported programs in Linux without resorting to virtualizing another operating system. Plus, it's free.

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Online Dating Thrives On New Platforms

Love conquers all, including the worst recession in decades. Despite a downturn across almost all online business segments, dating and matchmaking actually have been thriving on the Web in the past year. One of the biggest players in the market, Match.com, reported that its paid U.S. members grew 9% in the third quarter of 2009 compared to the same period in 2008. In a year when most Web companies said “flat is the new up,” the revenue from online dating actually jumped 5%, investment bank Piper Jaffray estimates.

It might seem to be true that people look for greater stability in their emotional lives during times of financial stress, but the growth spurt for online dating is attributable to a number of other changes. “There has always been a stigma with online dating,” says Clifford Lerner, CEO of Snap Interactive (www.snap-interactive.com), which runs the Are You Interested service on Facebook, MySpace, and iPhone, among others. “The rise of the social network has made the stigma go away quicker.”

Recent surveys confirm the new acceptance of digital dating. PeopleMedia, acquired last year by Match.com, found that 49% of Americans now know at least one person who has dated someone they met online, nearly twice the number (26%) that the Pew Internet & American Life survey found two years ago. Reviewing online prospects has become a part of everyday digital life for many Americans. According to comScore’s data last summer, more than 12 million of us visit the online personals every day.

Make Me A Match

Only a few years ago the online dating world was a simple “people search”



industry where Yahoo! Personals, Match.com, and others vied to build the biggest possible databases of singles for people to parse, filter, and search for potential relationships. Now, social networks, mobile platforms, and much more sophisticated matching services have joined the fray. For example, the now-famous eHarmony approach for “scientific” matching eschews the usual profile drilling and uses an extensive personal questionnaire and complex algorithms.

“We have six Ph.D. researchers on staff who are constantly investigating and understanding what makes long-term relationships successful and applying those findings to our matching models,” says Dr. Gian Gonzaga, eHarmony’s senior

director of research and development. It takes billions of database calculations to process the thousands of questions across 4TB of stored data to find matches for a user. The result, according to a 2008 Harris Interactive/eHarmony study, is that 236 eHarmony members matched through the site marry each day in the United States.

eHarmony competitors have not missed the success of scientific, database-driven matchmaking. Three years ago, Match.com launched its comparable site Chemistry.com. “It is a very different experience,” says Sharmistha Dubey, VP of product, Match.com. Not only do these sites cost more (around \$60 a month) than typical personals sites (around \$30 a month), but they also assure greater security against scammers who continue to plague online dating. Sites such as eHarmony or Chemistry.com often require matched users to go through a stage of anonymous exchanges (as well as lengthy questionnaires before even being matched up) for getting to know one another before they are given direct email contacts.

“The one big reason someone is attracted to Chemistry.com is not wanting to post their profile online to be found by anyone else,” says Dubey. While the classic online personals model lets people rifle through thousands of profiles, the new tech-driven approach is for “people who really want to take it slow.”

Social Network Or Dating Service?

For online daters, especially younger ones who want to accelerate their online dating, a new breed of service piggybacks on social networks such as Facebook and MySpace.

“We’ve designed it for people who want to date and not necessarily get

married,” says Alex Mehr, co-founder and CEO of Zoosk (www.zoosk.com). About 40 million people have installed the Zoosk app, which runs on the major social networks, and Mehr claims 10 million to 12 million members, called “zooskers,” actively use the service each month. Zoosk serves the 20-to-30-year-old market with an app that installs in seconds and requires no lengthy profile process because the social network has already done that.

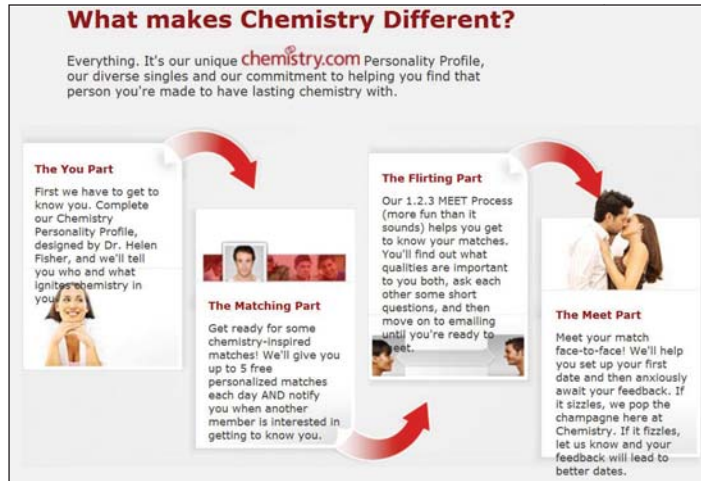
“If you are on Facebook, you are two clicks away from seeing people in your age range,” says Mehr.

When the social networks first emerged several years ago, they seemed to pose a direct threat to online dating. After all, most of these sites were all about relationships, connections, and discovering like-minded people. And although some people do use their existing profile pages as a way to meet new people, social networks have only created new markets and business models for online dating entrepreneurs such as Mehr. Many startups have crowded into the social network dating space with apps galore.

“What makes Facebook interesting for us is the ability to integrate your friends into your dating experience,” says Lerner.

The big upside for these companies is viral distribution. Are You Interested taps into a user’s social graph to play matchmaker among

Rather than compete with traditional online dating services, the massive social networks have become platforms for new online dating companies, such as Zoosk and business models, such as sending virtual gifts to impress a prospective date.



In the mid-2000s, “scientific” matchmaking sites such as eHarmony and Chemistry.com changed the game for online dating by applying massive computing power to the art of matching profiles. Both also offered members a more secure and slower process for discovering a soul mate.

friends. If current friends both use the app and tell Are You Interested they are interested in becoming more than friends, the service will alert both to their mutual attraction. Zoosk lets you solicit personal testimonials from your Facebook friends so that your Zoosk “Date Card” (profile page) gets more credibility. Snap Interactive claims more than 3 million monthly users after spending virtually nothing on advertising. Facebook friends-telling-friends generated more users for Are You Interested in a few days than a previous year as a stand-alone dating site.

And don’t be surprised if your social network suitors start passing you digital

roses. Online dating via the social nets has spawned a new ritual for getting a potential date’s attention, virtual gifting. “People are getting more comfortable with virtual currency, exchanging money for tokens and using them to send online gifts,” says Mehr. “A lot of it is coming out of videogames, where people got trained to [exchange real-world money for in-game items]. Instead of upgrading your game avatar, you upgrade your chances at being noticed by someone you ping for a date.

“If you want to stand out, send a bouquet of roses, or we have special delivery where we give you a more prominent position [in the recipient’s inbox] to the email you are sending,” says Mehr.

The major traditional players have not jumped on board the social app trend, although they keep an eye on these upstarts. eHarmony maintains a nominal Facebook/Twitter presence, while Match.com’s Dubey admits her company’s social media apps never gained traction. Nevertheless, “the dating category probably makes more money out of social network advertising than any other category,” she says. Match.com and other standalone dating services use banner ads on MySpace and Facebook to generate highly qualified new customers because, after all, this audience already hears the message. “Their frame of mind is already thinking about connecting with people,” says Dubey.

Dialing Into The New Game

For all of its relentless growth, online dating continues to be troubled by incidents of fraud and scams. Con artists still use these sites to play on people’s emotions and lure them into sending money.



“Unfortunately, online fraud is a serious and widespread problem, impacting all Internet companies and service providers,” says Dubey. Almost all of these companies are playing a cat-and-mouse game with criminals.

“This is an area that we combat aggressively and are continuously revising our methods to attempt to remain one step ahead of the frauds and spammers,” says Snap Interactive co-founder Darrell Lerner.

The next big battleground for online dating service supremacy will almost certainly be the mobile platform. Match.com, Snap, and Zoosk all have smartphone apps launched or forthcoming, and the initial results are very encouraging. (See “The Mobile Match-Up.”) Zoosk users can receive SMS notifications when someone flirts with their online profile. He sees mobile as another way to compete with the well-funded entrenched brands. iPhone and Android media are in the same state as Facebook two years ago when no brand—old or new—had a presence there. “We’re a lot more agile than eHarmony and Match.com, so taking them on with these platforms is not an issue,” he says.

But the real promise of mobile is not that it merely extends the Web dating experience to handheld devices. Almost

everyone in the field is already imagining how smartphones will add new pieces to the dating game. Clifford Lerner says Snap is rolling out a mobile chat feature that uses the location awareness of a phone to show you fellow members who are online, arranged in order of their distance from you. “I can be at lunch and see if there are any girls who are in my age range and how far away from me they are,” he says, “and I can start chatting with them right away.” Clifford Lerner acknowledges that such

scenarios will give many users pause but argues that his service would never pinpoint another member’s exact location and always advises users to exercise caution before agreeing to meet someone. Still, he says, “this,

in my opinion, is a game-changer in the industry.” Location awareness, multimedia messaging, etc., are all features the mobile platform adds to interactive dating.

“We are going to see cool things happen,” Clifford Lerner says.

And these services have to keep innovating because the industry has a high rate of customer churn. Their users often have high hopes for love that aren’t always fulfilled. According to Piper Jaffray, 41% of users surveyed never actually went out on a date via their dating service. Only 31% said they were satisfied with their provider. And yet, almost half of sub-

scribers check profiles more than 10 times a month, with 30% doing so every day. Love is fickle, and hope, if not happiness, springs eternal. ▲

by Steve Smith



Mobile is the next frontier for online dating, but will location awareness introduce a new set of privacy and safety issues?

The Mobile Match-Up

Almost everyone in the online dating industry seems to agree that the mobile platform is poised to change the matchmaking game. As Match.com’s VP of Product Sharmistha Dubey tells us, one of the world’s largest and most experienced companies in the space sees big changes in those little devices.

CPU: You’ve had a mobile Web presence for several years. How promising is mobile for online dating?

Dubey: We had a fairly decent adoption off of that technology. But earlier this year, we launched our iPhone app, then on the Palm Pre, and [soon] for other

smartphone devices. Mobile has significantly higher engagement as measured by the interaction with the site: logins, profiles, user communications. The same user, once they downloaded the app or started using the mobile site, has significantly higher engagement than a similar user had on the Web site.

CPU: Are these just the same Match.com members moving to mobile?

Dubey: The other interesting thing we hadn’t expected but are starting to see more and more this year is mobile has become a really interesting channel for acquisition of new leads. This

was just organic. For instance, on the iPhone downloads, more than half of the iPhone Match.com downloads were from people who were never introduced to Match.com before.

CPU: Do people use mobile online dating services differently?

Dubey: Yes. In terms of the number of profiles consumed by a mobile user vs. a Web site user, it is significantly higher on mobile. And while we see higher communication levels in general for those users, the number of emails actually typed and sent from the mobile is still relatively smaller. Anything that involves some level

of thinking and typing, etc., is a little bit less than the easier things like consuming profiles, uploading photos.

CPU: Do you see mobile changing the online dating game?

Dubey: Mobile today is simply an extension of the Web sites. What I am particularly fascinated and curious about is seeing how mobile-specific features come into play. An example would be location-based dating. There are tons of privacy concerns around it, which is why we have been back and forth on it. But that is interesting. There could be other communication modes that mobile may offer.

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The Department Of Stuff

by Rob "CmdrTaco" Malda

dlc.txt

Years ago, when you bought a game, that was pretty much it. You played it, maybe a hundred times, but ultimately it went into a dusty closet or to a friend.

This was the nature of games: They existed on floppy disks or cartridges. If there was a bug, maybe it would be possible to get a bug fix. But mostly that was it. If you wanted "more," you waited until the expansion pack or sequel.

Affordable broadband connections initially changed only part of this equation; convenient, fast connections between manufacturers and consumers made bug fixes and patches possible. In fact, now if a critical bug makes a game not work on your system, you expect a bug fix within a few weeks.

Unfortunately, for the game makers, this broadband connection also exists between consumers, making piracy childishly simple.

The rise of the massively multiplayer games added a great new revenue stream for the lucky few games able to attract and hold subscribers in appreciable numbers: monthly fees. But this doesn't work for every game. Most games don't require connection to a perpetual world to be fun, but that sure hasn't stopped manufacturers from trying.

What we've seen in the last few years is a rise in DLC, or downloadable content. Through DLC, game publishers can easily add new levels or worlds to previously released titles, generally in exchange for a small fee.

In Asian markets, this practice is more directly associated to gameplay. You want to be stronger? Go shell out some of your favorite local currency and buy a bigger sword. This model is very popular, and generally is the preferred payment method for people who don't want to pay a monthly subscription fee.

Console systems are able to abstract payment away from cash. Instead of paying in dollars, you pay in some sort of point system. This minimizes the sense of paying for the content.

Game makers love all this stuff because it cuts back on piracy and creates recurring

income streams. It also means that they can make money when you give your old game to your friends: They may have acquired the game without paying \$60, but if they want the extra content, they still have to shell out their own bucks.

My fear is that publishers are beginning to get greedy. Electronic Arts released paid DLC for *Dragon Age: Origins* that added only a few hours of gameplay and, worse than that, it added what is effectively a bank function. In other words, a bit of core functionality was left out of the original game, and then charged for after the fact.

It remains to be seen if consumers will reject this new tactic.

Shipping incomplete games with components being sold afterward could be seen as price gouging on the part of greedy game makers. If this led to a reduced MSRP of the original game, then I think a lot of people would be cool with it.

I've played the first-level demo of many games, only to learn that I'm not interested in paying for level 2.

I think a lot of people would pay a small sum for the first few hours of gameplay. Rather than paying \$60 for one incomplete game, gamers might play the first \$10 of a half-dozen games and shell out the full price for just the ones they like. It just seems unfair to charge \$60 for a game and then expect the readers to pay again in order to have the whole game.

Of course, there are players who will pay this price, but I suspect that the real upside for the industry is that the price increase will drive up the appeal of smaller games. The handheld market is doing very well with cheap games and extra content purchased later on; DLC fits naturally with these products. Very few of these games have the quality of the big boys, but cleverness doesn't have a budget, so it's only a matter of time before a few \$10 games with \$5 add-on packs become a price point that wins the hearts and wallets of the gaming community. ▲



Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

Contact me at malda@cpumag.com

Yeah, we know you have blogs to post, video to encode, reports to write, and code to compile. We do, too, but you have to take a break once in a while (and maybe blow some stuff up). That's why each month we give you the lowdown on what to expect from the latest interesting PC and console games.

CPU
Game Of The Month

LEFT 4 DEAD 2

No Room To Hide — by Dr. Malaprop

\$59.95 (360); \$49.99 (PC) • ESRB: (M)ature

Electronic Arts • www.l4d.com

Left 4 Dead 2 hit stores exactly a year after the runaway original. The virus is spreading, and the infected keep coming. This time, Left 4 Dead takes us to the Deep South (areas such as Georgia and Louisiana) and introduces us to four new characters—Coach, Ellis, Nick, and Rochelle. Each has a backstory that is fleshed out with conversations between the party members.

The original game had four campaign scenarios, and the sequel ups the ante by providing five new and longer scenarios: Dead Center, Dark Carnival, Swamp Fever, Hard Rain, and The Parish. You may think that having daylight would be less scary. You'd be wrong. The three modes from the original—Campaign, Versus, and Survival—return and are complemented by the Scavenge mode. Scavenge is multiplayer co-op where survivors attempt to collect and deliver fuel into generators. The infected never stop coming, so the object is to survive as many waves as possible. It's like Horde in Gears Of War 2.

For an extra, and more realistic, challenge, players can adjust certain settings related to in-game mechanics. For example, damage to the infected is weighted by the shot accuracy, and you can easily lose track of your teammates by setting their silhouettes to be unable to be seen through solid objects.

Other new content includes additional weapons, defibrillator kits, and more Special Infected. You'll still find the Boomer, Hunter, Smoker, Tank, and Witch (who can now be found wandering through some maps). However, there are three interesting new Specials that have been added to the mix. The Charger can knock you flat or even smash you into the earth for extra damage. Another is the Jockey, who leaps onto your back and corrals you away from your team. The Jockey hits you while running and



heads off to finish you away from your teammates. The Spitter usually doesn't kill you but deals damage with her acidic bile.

The A.I. Director has also been improved, and you'll no longer be able to easily convene on a secured area to methodically take out the infected. This results in the need to always be on the move and keep your group of survivors in formation. As before, the Director is like the Dungeon Master—all-seeing, all-knowing, and creating your experience on the fly.

Fans of the original will likely gravitate to this sequel. Yes, Left 4 Dead 2 has become an altogether more complex game in its evolution and no longer has that easy pick-up-and-play quality. However, for those who make the extra effort, gameplay is more fulfilling. The art style is fitting, but visuals will not be mistaken for cutting edge. As before, the PC version looks best, thanks to resolution and discrete graphics, but the 360 version isn't too shabby. There is more narrative, but it feels minimal. We would've liked extra details surrounding the epidemic. Weather is dynamic (for example, pelting rain in the Hard Rain scenario) and adds much ambiance and atmosphere. Brand-new physics dictate the trajectory of flying body parts as you hack at the infected. Audio is improved over the already excellent effects of the original.

There was some controversy when Valve announced the game in 2009, because some fans felt that Left 4 Dead 2 was essentially repurposed DLC-quality content. To be clear, it isn't. There's a lot more content, gameplay, and options that make it worthy of the sequel moniker. Left 4 Dead 2 continues to be an enjoyable top-tier, action-oriented co-op experience that's not for the faint-hearted. It's bloody, in-your-face, heart-pounding, unadulterated, zombie-bashing fun. ▲

DEAD SPACE

EXTRACTION

Scares On Rails—Again – *by Dr. Malaprop*

\$49.95 (Wii) • ESRB: (M)ature • Electronic Arts • deadspace.ea.com

In our review early last year, we proclaimed our love for *Dead Space*, an action-horror shooter on the 360, PS3, and PC. *Dead Space Extraction* is a follow-up Wii-exclusive title with a storyline that weaves into the original's but starts with a mining colony on the planet Aegis VII.

Extraction is a gruesome action-horror light-gun shooter. The game features 10 chapters, each requiring approximately a half hour to complete. The on-rails gameplay mechanic lets developer Visceral Games tell a highly effective story that's brought to life with top-notch voice acting, visuals, and production. The end result will have you

discovering many new locales on Aegis VII and also onboard the *USG Ishimura*.

Extraction supports the Nintendo Wii Zapper but remains happily playable without that \$20 accessory. You can invite a friend to jump into the game with you at any time for local co-op. Mining equipment doubles as weapons. In addition to your unlimited rivet gun, you'll also wield a line gun, plasma cutter, and arc welder, each featuring an alternative fire mode accessed by twisting the controller. Shaking the Wii remote will throw off necromorphs and lights glow sticks in dark areas. Like the original, dismembering aliens is more satisfying than simple headshots. The ammo, health, audio logs, and upgrades can be easily missed if you don't play close attention along the way.

Sadly, there's not much replay value, and the \$50 asking price is wince-worthy; renting may be advisable. *Dead Space 2* was announced as we went to press, so expect the scares to keep on coming. ▲



GOD OF WAR

Collection



\$39.99 (PS3) • ESRB: (M)ature

Runic Games • www.godofwar.com/collections

PS2 Games Enhanced For Playstation 3 – *by Dr. Malaprop*

With the impending spring 2010 release of *God of War III*, Sony has repackaged and released *God of War* and its imaginatively titled sequel, *God of War II* (along with its original bonus content), on a single Blu-ray disc for the PS3. *God of War* was released in 2005 for the PS2 with a sequel following in 2007. Both games were received very well by gamers and critics. You can find more detail in our original glowing reviews (see page 88 in

the June 2005 issue and page 90 in the May 2007 issue for *GoW* and *GoW II*, respectively), but the series is essentially hack-and-slash action-adventure. Both games feature Kratos, the god of war in Greek mythology. The heavy violence of the game is interspersed with platforming, puzzle elements, and QTEs.

Both games support 480p on the PS2, but this bundle has a number of technical improvements to make it more interesting for



PS3 gamers. The *God of War Collection* natively outputs at 720p and features 2X anti-aliasing that was not in the original release. That's partially why the graphics of these two PS2 classics hold up so well on an HDTV today. In-game frame rate is locked to 60fps, so movement is buttery-smooth. All these in-game visual improvements are clear when compared against the cutscenes, which pale in comparison.

God of War fans will also enjoy the PS3-exclusive *God of War III* demo, which remains true to the series' core hack-and-slash formula. This release is budget-friendly at \$40, and the 20-ish hours of gameplay make it feel worthwhile. We strongly recommend the *Collection* if you never experienced *God of War* on the PS2. ▲

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Rock The Block – by Dr. Malaprop

\$49.99 (360, PS3, Wii) • ESRB: (E)veryone 10+
Electronic Arts • www.rockband.com/games/lego



Rhythm games have been all the rage for a few years, and Lego has done great work with adapting Star Wars, Batman, and Indiana Jones. Given the humor, fun gameplay, and commercial success of these adaptations, is anyone surprised that Lego took on the rhythm game genre?

Lego Rock Band targets more family-friendly fare with its 45 songs. All tracks are accessible in Free-Play mode, but you'll need to progress through venues in the surprisingly enjoyable Story mode.

The game's Super Easy mode can be played by any age, but additional

difficulty options are available to make this more challenging when your toddlers pick up some axe skills. Multiplayer is limited to a local band, and there's no online mode. In the Story mode, your band will play through progressively more difficult songs. Occasional flashbacks let you play in the blocks of David Bowie or Queen. It's fun for the family, but only if you already own the instruments and want the songs (many of which are already present in other rhythm game titles). ▲



A Highlight In The Series by Dr. Malaprop

\$59.99 (PS3) • ESRB: (E)veryone
Sony Computer Entertainment • www.ratchetandclank.com

A Crack in Time picks up after the cliffhanger of its predecessor, with Ratchet searching for his robot friend, Clank, as the time-space continuum is being ripped apart by Dr. Nefarious. Various villains tie the two separate character threads together. Ratchet levels are combat-centric, while Clank's focus on puzzles. In addition to puzzles and combat, there's a heavy dose of platforming, too. We loved the all-new hover boots that let you move more speedily through the world.

Nearly everything in the game is upgradable, and you'll find yourself consumed with buying items as you

progress. The bizarre array of weapons and gadgets here remains fun and satisfying.

Progress is still linear, but outer space acts like a hub to the various planets. The game's weakness is the repetitive space combat, but it wasn't enough to detract from getting to the endgame—about 10 to 12 hours to complete without multiplayer. The cartoonish world is visually attractive but not an improvement over its predecessor. Sill, fans of the series won't be disappointed. ▲



Logitech G110 Budget-Friendly Tool For Gamers – by Dr. Malaprop

Back in August 2009, we gave Logitech's G19 keyboard a near-perfect rating. (See page 38.) And for those without a budget, it would receive our highest recommendation for a gaming keyboard. But spending \$200 on a keyboard doesn't bode as well for gamers on a budget. That's the demographic that Logitech is seemingly targeting with the G110.

The G110 has a low profile with keys that have a solid tactile feel. It's fairly wide, with two columns of G-keys residing to the left of the ESC key. Each of the 12 G-keys can be programmed with up to three macros. Other features include a customizable LED backlight, a



G110
\$79.99
Logitech
www.logitech.com



Game button to disable the Windows key, integrated USB audio, and media keys.

If you've been craving the G19 but are unable to afford it, purchase the G110 instead. It's essentially the G19 but at about a third of the cost. The missing GamePanel LCD is a bit of a buzzkill, but this is a compromise we were able to live with for the price of entry. Now if only Logitech would release an ergonomic version. ▲

The Cutting Edge

by Barry Brenesal

To The Archives!

Archiving programs appeared back in the 1970s, as a method of storing and transferring Unix-generated data. During the 1980s, with the rise of the bulletin board, archivers became important in private computing. In fact, your archiver was one of your greatest friends if you wanted to share software you'd made over the typically slow modems available at the time. Archivers let you gather up all your files into one neat bundle and reduced the size of that bundle into something that bordered on the manageable.

How archiving programs accomplish this varies from type to type, but most employ a form of lossless data compression, a class of algorithms that support the exact reconstruction of whatever content is being compressed. They also store meta-information about timestamps, the operating system, and a host of other material that has been used to create increasingly sophisticated archiving models over the years.

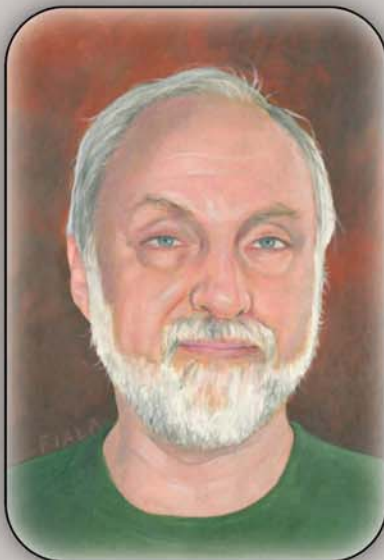
During the 1990s, a wide variety of archivers became available, for a variety of reasons. More than a few developers wanted their own proprietary data or archival formats for their software releases. Then there were archivers designed for specific platforms, such as ShrinkIt (SHK) and Compact Pro (CPT), that competed with StuffIt (SIT, SITX) on the Mac back in the 1990s; or by extension (yes, it's a pun; I have faith you can deal with it), the cross-platform HPACK (HPK). Some migrated to new platforms with their creators, such as LZX, an Amiga standard that was developed in 1995 by Jonathan Forbes and Tomi Poutanen while attending Canada's University of Waterloo. When Forbes joined Microsoft in 1997, he improved the company's Cabinet (CAB) and compressed HTML Help (CHM) files with a superior version of LZX compression. In a move that should please fans of reciprocity everywhere, Haruyasu Yoshizaki's LHA was popular initially on the PC but faded after Windows appeared, only to do extremely well now as an Amiga port because it is utilized by Aminet, the world's largest Amiga-related software depository.

There were also archivers intended for development platforms. These include the likes of the Compressed Archive File (BOO) employed in older MS-DOS Kermit

binaries, and Quadruple D (QDA), used for Delphi. Another popular Delphi archiver is BlakHole—not perhaps the most reassuring name for a format whose archives you eventually want to decompress, but it did become the primary compression component of the ingenious archival system, ZipTV. Other archive software developers were involved in an “anything you can program I can program better” race to invent a host of new features. Among these were high-level encryption, wildcard support, various combinations of speed and compression, creating a self-executable de-archiver, and the ability

to support multiple archival formats. Some developers went considerably further. For example, Robert K. Jung's ARJ, a formidable rival to PKZIP in the 1990s, not only offered very efficiently compressed archives, but a multi-volume option that split and recombined archives across up to 99 discs. It could store up to 250 backups within a single archive, and process up to 100,000 files for compression in an archive. WinRAR, one of the current major competitors in the PC-based archive market, provides background archiving, support for 45 languages, stored compression profiles, and the ability to search archives.

The other two major archival flavors on today's PC both owe their origin to Phil Katz: PKWare, because he created the company and the cutting edge ZIP format, and WinZip, because Katz was slow off the mark with a patent, while Nico Mak realized the PC future lay in Windows. Katz himself was a curious figure: The best-known developer in his software field, he was a brilliant, shy alcoholic who was found dead of acute pancreatic bleeding in a hotel room before he'd turned 40. It was a lawsuit with System Enhancement Associates—incorrectly portrayed as the little guy struggling against the big corporation—that catapulted him to fame, but his legacy is far from negligible. It was Katz's determination to dominate the archival field that first revealed many of the possibilities in the category, and it is his vision of it that arguably remains his strongest legacy. ▲



Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100.

It was last seen functioning as a boat anchor.

Wax nostalgic with Barry
at barry@cpumag.com

Software

Tips & Projects

Windows 7: The Tools & Tweaks

Now that you've installed Windows 7 and played around with the first and second order tweaks, it's time to find the tools that will really drill into your system. We'll look at some of the more obscure diagnostics and tweak tools hidden within Win7, as well as the first set of third-party utilities (plus an oldie or two) that helps streamline your Win7 tweaking.

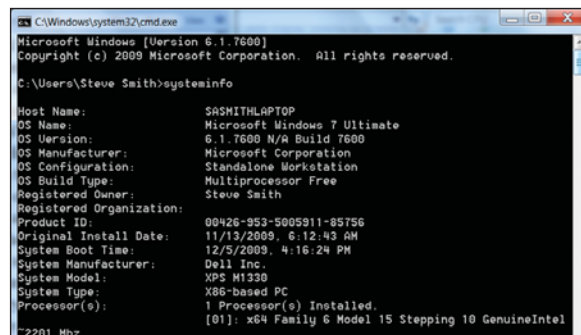
Fair warning: We've run all of these programs on a laptop recently upgraded to Win7 Ultimate and have found them useful and reliable. We didn't detect any unwelcome peripheral software installs or other potential hazards, but you should always ensure that you download freeware and shareware files from a reliable source and that your malware defenses are current whenever you install new software.

Built-in Diagnostics

We covered some of the powerful diagnostics tools available within Win7 when we previewed the OS last year. There are others we haven't covered yet that are planted deeper in the OS especially for administrators and command line junkies. For instance, run a command line window and type **systeminfo**. You will receive a detailed profile of your system, including the OS version and its updates, BIOS version, installed/available memory, network connection, and even basic hardware specs. This is a quick way for an admin to determine the state and

components of a PC he is working on.

The program also allows you to output the profile into several formats, such as comma delimited. For example, to produce a comma delimited file that you can import into a database or spreadsheet program, use the command **systeminfo /FO CSV >systeminfo.csv** to redirect the comma



```

C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\Steve Smith>systeminfo

Host Name:                            SASMITHLAPTOP
OS Name:                              Microsoft Windows 7 Ultimate
OS Version:                           6.1.7600 N/A Build 7600
OS Manufacturer:                     Microsoft Corporation
OS Configuration:                    Standalone Workstation
OS Build Type:                         Multiprocessor Free
Registered Owner:                     Steve Smith
Product ID:                           00426-953-5005911-85756
Original Install Date:                11/13/2009, 6:12:43 AM
System Boot Time:                     12/5/2009, 4:16:24 PM
System Manufacturer:                  Dell Inc.
System Model:                          XPS M1330
System Type:                          X86-based PC
Processor(s):                         1 Processor(s) Installed.
[0]: x64 Family 6 Model 15 Stepping 10 GenuineIntel ~2201 Mhz
  
```

Systeminfo is a command line diagnostic that can sniff hardware specs from the current machine or from across your network.

delimited format to a file. This will give you the CSV file in the current directory to open with an appropriate program. There is also the **/S** parameter, which will let you grab the Systeminfo from another PC on the network. Naturally, you'll need the system name and any username and password necessary to access the remote system. Use the **systeminfo /?** command to get all of the available parameters and syntax.

Your System Deep Dive

One of our favorite tools for peering into your hardware and software environments, System Information, actually is not exclusive to Win7. You can find it in

Vista, too. Nevertheless, if you want to see how Win7 has been installed on your system, where things potentially can go wrong, and where all of those drivers and relevant system files are being stored, this is the place to go.

In the Start Search box, just type **system information** to launch that program. It looks much like one of the MMC modules Vista and Win7 have for advanced administrative users, offering a System Summary tree with Hardware Resources, Components, and Software Environment Branches.

You can explore all of the detail in this great tool yourself, but there are a couple of cool points worth noting for troubleshooters. First, media mavens who need to know exactly which versions of what video and audio codecs are installed in their system can find that information in the Components/Multimedia section; mousing over the File entry for each codec will reveal the relevant file's name and location in case you need to eliminate a troublesome one.

While you're in the Components section, look at the Problem Devices item. Here you may find devices and drivers that aren't playing nice with Win7. For instance, this is where we discovered that our VPN adapter was failing under Win7.

Finally, under Software Environment, make sure to check the Windows Error Report for a log of major errors. You will see a detailed rundown of application hangs and error reports from Windows.

For serious PC hardware jockeys, you might want to pin System Information to the Start menu or Taskbar. Just use the search box to call the program to the surface, right click on the item, and use the appropriate command. Even better, you can assign the program a shortcut keyboard combo. Select the Properties item when you right-click System Information and use the Shortcut tab.

What's Eating My Hard Drive?

Where did all of that storage space go? All of those downloads and multimedia

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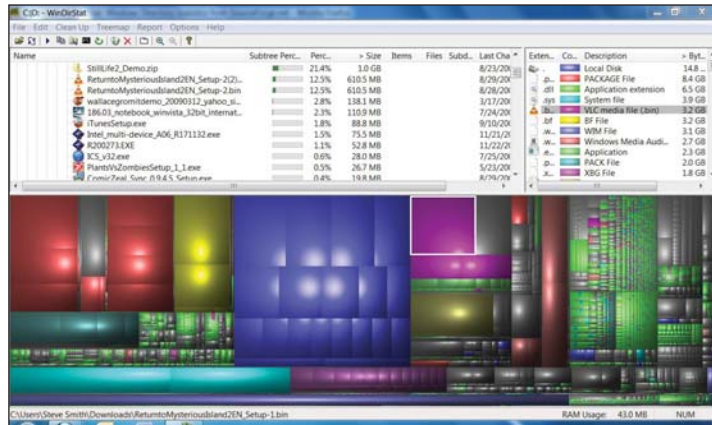
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kingston.com/hyperx

files can catch up with your system. If even after uninstalling and file cleansing your system you still need to trim more fat, then the free WinDirStat (windirstat.info) is among the best we've seen. This tool analyzes your drives to categorize and color-code all of the files, creating a visual map of the drives. It also lets you aggregate the files so you can find where all those JPEGs are scattered. It can order the files by size to make it easier to cut the largest space eaters first. WinDirStat works across most versions of Windows, starting with Windows 95.

One of the first shareware Win7 tweaking tools is Tweak7, available from its publisher Stardock (www.stardock.com/products/tweak7). The free version will nag you to upgrade and doesn't include some advanced features for security handling, memory optimization, and startup management. Still, the program offers a great education on Win7's features simply because it maintains a great database of functions. For instance, in the Resources section, referencing the Start Up Programs section not only shows you what programs are loading at startup but also provides detailed help files on each that describe the associated programs and the role the program plays. In the Service Profile section, Tweak7 outlines the major background services that are running but lets you mouse over each for an in-depth explanation.



WinDirStat gives you a graphical map of your hard drive and lets you tease out the hidden files that are eating up your storage space.

Clean Out The Crud

If you just bought a new PC with Win7 loaded from a major OEM, then you likely also have a lot of unwelcome preloaded software. Hardware manufacturers cut many deals with software and games manufacturers to preload trials of their software onto systems, and these can gunk up any new PC. The PC Decrapifier (pcdecrapifier.com) is freeware designed just to ferret out many of these culprits, but keep a couple things in mind before letting it run wild. First, the program itself warns that it can be difficult to tell the difference between trialware and full versions of software that you may want to keep on a machine. Don't just do a cursory scan of the choices the program makes for you. Look carefully at what it proposes to eliminate before letting it uninstall

things. Also, definitely make a Restore Point. PC Decrapifier will find the bloat in its first pass and then also offer to uninstall other programs if you let it. We ran into one problem when PC Decrapifier ran too many uninstall routines at once, and they seemed to clash with one another. You may want to limit the number of programs you instruct this program to uninstall at a time. ▲

by Steve Smith

Windows Tip Of The Month

In Windows 7, your Windows key can be very powerful. Learn some of these primary combos for great mouse-free interface control.

Win-Down arrow: Restore down a maximized window or minimize an open window that is not maximized

Win-Left/Right arrow: Snaps current window to the left or right edge of the Desktop and sizes it to fill half the screen

Win-G: Show Gadgets

Win-T: Activates Taskbar. Use directional keys to navigate Tasks. Pressing ENTER will open the program or switch to its open task.

Registry Tip Of The Month

Turning your open Windows transparent with the Windows 7 Aero Peek feature is one of the new OS' coolest features. But you may want to speed up or slow down the effect when you hover the cursor over the right-most edge of the Taskbar. Go to HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced. Right-click to create a New/DWORD and name it "DesktopLivePreviewHoverTime". Set the Base to Decimal. In the Value Data space, set to a millisecond number. A "0" setting will activate Aero Peek instantly, "500" will give you a half-second delay, "1000" a full second, etc.

Infinite Loop

Couple Tweets Nuptials, In The Running For Lamest Wedding Ever

Look, we know that we live in an age of ultra-connectedness. Everyone knows what everyone else is doing at any time, all the time—we get it. But we don't have to like it. Case in point: Dana Hanna recently changed his Facebook relationship status and tweeted news of his marriage as it was happening. The ever-chivalrous Hanna revealed a phone for himself and his wife, who undoubtedly tweeted "Having second thoughts after realizing I just said 'I do' to someone who would rather update his Facebook page than kiss me."

Source: latimesblogs.latimes.com/technology/2009/12/groom-updates-facebook-twitter-at-the-altar.html



Warm Up To Penguins

Do Everything Virtually

As much of a Linux fan as anyone can be, the simple undeniable fact is that Windows is the dominant operating system. As a result, there are a lot of Linux projects that focus on providing alternatives to Windows programs. Sometimes these projects take the form of applications that have similar features and functionality as Windows programs. For example, OpenOffice.org is a complete Office suite that serves as an alternative to Microsoft Office. Other times the alternatives take the form of avoiding the entire Windows system, such as Wine. The Wine environment lets you run Windows applications without needing the entire Windows OS.

But sometimes, no matter how many alternatives are offered, you'll find that you need an actual Windows environment. Even in these cases, succumbing completely to Windows isn't your only choice. A common option is to set your system up in a dual-boot environment. Another way of running Windows applications in a Windows environment without interfering with your boot process is to run Windows in a virtual environment.

Previously, virtualization programs had such steep hardware requirements that they were only available in corporate environments. But as computer hardware performance has gone up and prices have gone down, running virtual setups is perfectly acceptable for desktop users. In virtual environments, you can put the

Windows system in as much of a sandbox as you like. It can interact as much, or as little, with the actual Linux system.

Commercial virtualization programs exist for enterprises, but you may be surprised to know that there are some free ones available, as well. Free virtualization programs are scaled-down versions of their commercial counterparts, but that doesn't make them any less useful. Even better is that one of the free versions is also an open-source project, so you can see how these programs actually work.

How Good Is Virtualization?

For the uninitiated, virtualization software emulates almost every single piece of hardware. While the virtualization program is running it creates a complete virtual environment that, for all intents and purposes, appears to be hardware. Whatever you run in that environment thinks it's running on actual hardware, even though it's not. Because the virtual environment is generally emulated, you can usually mix and match real hardware with emulated stuff.

The virtual environment is so complete that operating systems installers generally aren't aware you are running them within a virtual environment. It's

that comprehensive level of emulation that makes it possible for you to install Windows into a virtual environment. Plus, virtualization applications make things so transparently that you don't need Linux drivers to have them work in the virtual environment. For example, some hardware devices that don't have Linux drivers can run from within a virtualized Windows environment.

Another use for using Windows in a virtual environment is to run programs that don't exist in Linux. Suppose your company lets you establish a secure VPN connection to remotely log in to your work environment. A surefire way to run your company's VPN client of choice under Linux is to run the program in a virtualized version of Windows.

Along with being able to run Windows-only programs in Linux, you can use these virtual environments for



Here is an example of Mozilla Firefox running under VMware Server.

testing purposes. Suppose you wanted to compare two video-editing programs. You could set up clean virtual environments that have exactly what you want for your tests. You can then accurately see how each program behaves without having other nonessential components interfering with your tests.

VMware Server

VMware Workstation released in 1999 was one of the first virtualization products for the desktop user. Since

that time, it has grown in popularity and functionality to become one of the most widely used virtualization products around. VMware Server is intended as an entry-level server virtualization product based upon VMware Workstation and is available for free. Although VMware Server is intended for server-class systems, nothing's stopping you from installing it on a desktop. You use your Web browser to manage your virtual machines; VMware provides the necessary browser plug-ins when you install VMware Server.

Because it's targeted for the server environment, VMware Server lacks some of the consumer-oriented features that exist in VMware Workstation. For example, where VMware Workstation gives you 3D graphics support with DirectX and OpenGL, VMware Server lacks this type of support. But that's a relatively minor issue considering the other tools available.

A useful sandboxing tool available with VMware Server is the ability to create multiple networking environments. You can make virtual machines appear as actual machines on your live network with bridged networking. Or if you want to have the server machine act as a router, you can have your virtual machine use the NAT networking option. Finally, if you want your virtual machine to only talk to itself and the server system, you can use Host Only networking.

Another useful feature with VMware Server is the ability to run 64-bit operating systems virtually. If you have a 64-bit CPU that supports virtualization, you can create an environment where you can load a 64-bit OS in that environment. So, for example, you can have VMware Server running on a 64-bit Linux system and install Windows XP x64 into that environment. And this operating system install can be running alongside a virtualized 32-bit WinXP setup.

VirtualBox

Another perfectly capable, and free, virtualization product is Sun's

VirtualBox. Just like VMware Server, you can install and run a variety of operating systems in a complete virtual environment. VirtualBox comes in closed- and open-source flavors. Both are free, but the closed-source version is intended for personal and evaluation purposes only. If you want to use VirtualBox in a corporate environment, you will need to contact a Sun salesperson. The closed-source version also has a few extra features not available in VirtualBox OSE (Open Source Edition). One of the more important features missing from VirtualBox OSE is support for USB devices.

VirtualBox's snapshot capability is a definite advantage over VMware Server. VMware Server limits you to a single snapshot, so that you have a single point in time you can revert to. With VirtualBox, however, you are able to create multiple snapshots. You can create multiple snapshots and have many different branches of different snapshot scenarios. This makes it possible to create multiple "what-if" situations that you can look at individually.

For example, suppose you wanted to see how two similar programs behave in the same environment. With VMware Server, you could create an environment you want to use and take a snapshot of it. Next, you would install and evaluate one of the programs. Once you're done with the evaluation, you'd have to revert to the snapshot and then look at the other program. With VirtualBox, you can create the environment you want to use and then take a snapshot. Next, you can install one of the programs you're looking at, and then take a snapshot after its installation. You could then jump to the first snapshot, install the other program you want to see, and take a snapshot of that. So, with VirtualBox, you can use snapshots to compare each program in its own unique environment.

VirtualBox also has the ability to read and write VMware and Microsoft Virtual PC disk images.

So if you already have a set of virtual disk images for either of those programs, you can use them immediately with VirtualBox. This makes migrating to VirtualBox a lot less difficult because you don't have to re-create, or even convert, any existing virtual disks you may have lying around.

Virtually Limitless Potential

Virtualization helps bridge a large gap that many Windows users migrating to Linux face. Although there may be comparable apps available for Linux, the simple fact is that the vast majority of software is Windows-based. And free virtualization software makes it possible to ease yourself into a Linux setup. ▲

by John Jung

Infinite Loop

The Michael Jackson-Sonic The Hedgehog Connection

The 2009 death of Michael Jackson reached every corner of the world, including the digital world, where the King of Pop was the most-searched of the year. MJ even reached one of the much less traveled corners of said digital world: the Sega Genesis. Yes, if the rumors are true, you can add "uncredited Sonic the Hedgehog 3 composer" to the list of Jackson's accolades. Supposedly, Jackson worked with credited Sonic 3 composer Brad Buxer but was displeased with the end result and thus didn't want to be credited with the composition.



Source: www.techdigest.tv/2009/12/was_michael_jack.html

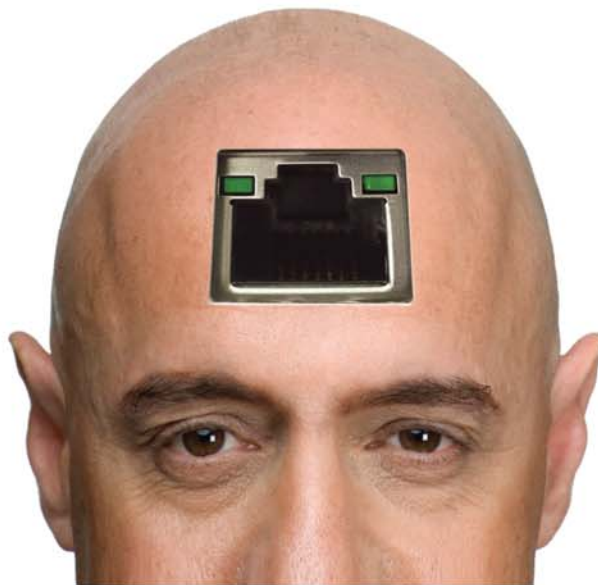


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Shavings From The Rumour Mill

by Mike Magee

Intel's Larrabee Won't Go Away

They say a week's a long time in politics, but a month is like a year in the graphics sector. Last month's column was largely about AMD's Fusion technology—I mentioned Intel's Larrabee project then, as well—but now the chip giant has done a complete U-turn and said it won't produce a discrete Larrabee chip aimed at the graphics market.

This is not totally a surprise, as Larrabee faced a number of obstacles, including the fact that ATI and Nvidia are frightened of Intel's share, and so too are the distributors of products made by the graphics specialists.

And that's not to mention the technical difficulties. Intel was, many independent observers felt, very optimistic in bringing an entirely new ray-tracing paradigm to the market in a very short period of time. Someone at Intel at a senior level obviously thought so, too, and bit the bullet.

While Intel has something of a background in failing to produce discrete graphics products, in the realm of integrated graphics for PCs it remains the unstoppable King of the Graphics Frontier.

It's not just technology, though. Nvidia and Intel are engaged in a bitter war. Intel has just signed a memorandum of understanding with AMD and avoided a potentially serious antitrust action. At this stage, Intel has got to be conciliatory and absolutely avoid the impression it is trying to use its muscle to grab the discrete graphics market from both AMD and Nvidia.

Of course, Intel will unveil its first CPU that includes integrated graphics this month. That's only 10 years late—Intel told me in 1990 this would happen by the end of the 20th century, and now we're at the end of the first decade of the 21st century.

Things don't always go as planned, and making semiconductors really is a lot more difficult than putting a bit of faulty software together and rolling it out.

I asked Intel about Larrabee, and my contacts explained that it's a large and complicated project that will take years to complete. It's not all about graphics, and the company is disappointed that products

aren't yet ready. Intel will talk more about where Larrabee is going sometime this year.

AMD and Nvidia are only slightly disappointed. Intel will continue to dominate the market for integrated graphics on chipsets and won't deliver itself into the hands of antitrust investigators who might think the Santa Clara company is getting too big for its boots.

I really wonder if senior executives at Intel realized that AMD

might be ahead of it on the Fusion curve. Perhaps, it wasn't really such a stupid idea AMD buying ATI, after all. Perhaps Intel will be ready to compete head on with Fusion in 2011, once it's got its Larrabee "platform" in order.

One thing's for sure: Despite headlines across the world proclaiming that Larrabee has been canned, Intel is definitely saying that it's far from canned. The company firmly believes that its Larrabee technology might deliver some supercomputing results that Nvidia (the company it will "never take over") won't.

And it has one big advantage over Nvidia, although we don't think the same is true of AMD; Intel has a superior process technology over every other semiconductor company on the planet in terms of sheer production and small size. IBM may have an equivalent process technology, but it's messed with Intel before and is now steering clear, probably forever.

And yet, Intel is frightened by the possibility that GlobalFoundries, having been spun off from AMD as a separate unit, might come to develop superior technology, particularly so as there appears to be a very close relationship between it and Nvidia. If GlobalFoundries is sufficiently compelling, it's quite possible that Nvidia might take advantage of its future process technology, too.

Knowing Intel, the company would likely rather go down in flames than ever avail itself of some other company's superior process technology. (Unless, of course, there was no alternative.) Pride does come before a fall. ▲



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

Send rumours to "Mad Mike" Magee
at mike@cpumag.com

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Technically Speaking

An Interview With
University Of Pennsylvania
Asst. Professor Keith Hampton

Keith N. Hampton is an assistant professor in the Annenberg School for Communication at the University of Pennsylvania. His research interests focus on the relationship between information and communication technologies, social networks, and the urban environment.

by Barry Brenesal



CPU: The Personal Networks and Community Survey, sponsored by the Pew Internet & American Life Project, was recently completed and a report published. As the leader of the research team, can you tell us what this survey was designed to find out?

Hampton: The survey and its report deal with the question of whether or not new technologies such as the Internet or mobile phones are responsible for or associated with an increase in social isolation in America, or disengagement from neighborhoods, volunteer groups, or public spaces such as parks and cafés.

In particular, we wanted to respond to an article that was published in 2006, written by sociologists who reported on the findings of a comparison between two editions of the United States General Social Survey—which is a large, federally funded biannual survey conducted by the National Opinion Research Center. They examined a series of questions that were asked about people's social networks in 1985 and 2004. They found that over that period, the amount of social isolation in America had tripled; that the average size of people's core discussion networks had declined by about a third; and that a larger number of

Americans reported that they had no one outside of the family with whom they could discuss important matters.

We wanted to address that article because, while they did not have an explanation for this really big change—and it was a huge, social change—they did note that the rise of the Internet and mobile phones corresponded to the same time period. One possibility that they offered was that the new technologies were responsible for this rise in social isolation and decrease in the size and diversity of our core discussion networks.

CPU: How did you conduct your survey, and how many respondents did it include?

Hampton: It was a random-digit telephone survey of 2,512 Americans. Recognizing that an increasingly large proportion of people have abandoned the use of traditional, landline phones—particularly those in younger age groups—we included a small subsample of about 500 people we interviewed through cell phones.

CPU: What were the general conclusions you arrived at after analyzing your survey's data?

Hampton: We looked first at whether or not we could replicate the findings of that previous study by identifying increased social isolation over the last 20 years. We could not. We asked people the same question the previous survey did: with whom do you discuss important matters? What we found was that the number of people who had nobody with whom to discuss important matters in the previous six months was about the same number as in 1985. From that, we concluded there was something wrong with the General Social Survey data collected in 2004, and we're not the first to speculate in this fashion. We were, however, the first to report actual data that demonstrates this.

CPU: What were the flaws in that earlier survey?

Hampton: They suffered from two problems. The first was a random technical error that produced more zeros than there should have been when people answered the question, "With whom do you discuss important matters?" That led to an over-reporting of social isolation. Our results found credible that the size and diversity of our core networks had declined, but their conclusion—that

this might have something to do with the Internet and mobile phone use—was not correct.

We did find that the average size and diversity of Americans' core social groups have declined over roughly the last 20 years. But contrary to previous speculation, we also discovered that Internet users and cell phone users were doing better than the rest. [On average], their core networks were larger and more diverse.

CPU: Why are these core discussion networks so significant to us?

Hampton: Because they provide us with the broadest forms of support. They

they're Democrats, they're much more likely to have someone in that role who is Republican, and vice versa.

CPU: Are there any caveats to all this?

Hampton: We don't know the causal direction. We don't know that using the Internet actually leads to more diverse discussion groups. It could be that people who have more diverse discussion networks use the Web in this way. But it may also be a third finding, which is unique to this study—that is, a social medium, such as sharing photos online, blogging, or social networking Web sites—may actually increase your understanding of your existing social network. We know, for

Hampton: It's accounted for completely by their level of technology use. The reason we're able to get that specific is because we use a tried-and-true technique, regression analysis, that allows us to pull out the different influences that contribute to some outcome, such as the size of your core discussion network. So we're able to identify the relative contribution of age, education, gender, and different types of technology to that outcome.

CPU: Let me throw another interesting statistic out from your report: People who own cell phones tend to have 25% more core network members who are not family members. Do we

I do think that those people who blog
probably increase their exposure to
various concepts—and blogging, in and of itself,
could be considered a civic activity. —Keith Hampton

give us companionship, emergency aid, and help during a crisis. They are also very important when it comes to opinion formation. Having a diverse number of people with whom you can discuss crucial matters helps advance opinion quality. Those people who have more diverse discussion networks tend to have more well-formed opinions, to be more tolerant and trusting of others.

It's also important at a larger, societal level because we would like to think we have a population that is very well-informed about various issues, rather than existing inside insular silos. The ability to take part in discussions about a range of topics and recognize diversity within those opinions is vital for democratic participation. Consider, for example, what seems at first to be a rather surprising finding: Those people who upload photos to share online are more likely to know someone of another political party than their own with whom they discuss important matters. If

example, that people assume they have a lot in common with their closed core networks, whether they do or not. People often believe that if they share one opinion, they share many. What we could be seeing is that the use of new social media actually streams information to you that you otherwise wouldn't have had, such as political party affiliations. This makes you feel that your network has become more diverse, even though that diversity has always been there.

CPU: You note that within your survey group, the average Caucasian or African-American female with an undergraduate university degree who has a mobile phone, uses the Internet to share photos, and uses instant messaging, has 2.55 confidants. This compares to 0.91 confidants for an average woman who has the same race and education, but does not upload photos online, engage in instant messaging, or own a mobile phone. That's quite a difference.

have any understanding of why this is the case?

Hampton: We look at our closest social ties. We divide them between family members and non-family members. The former tend to be the most similar in many ways, and not only genetically: They share many of our beliefs, attitudes, and opinions. The latter consists primarily of co-workers, neighbors, and people you know from other voluntary associations. We know that those non-family members tend to be more diverse than our kin in their opinions, backgrounds, and even the types of resources they can mobilize to help us in crisis. So it's ideal to have a network that has a good proportion of non-kin if we want to be able to maximize our resource and informational advantages.

The finding that mobile phone users are particularly open to non-kin in these networks is a little surprising. Mobile

phone users tend to use their devices to talk to a relatively small set of people. So it has long been feared that the use of mobile phones would actually lead to less diversity within core discussion networks—that we would want to call people who are most like us, to verify our existing attitudes and opinions. But in fact that doesn't seem to be true.

CPU: Is the conclusion from the 2006 report that Web-based social activities have no positive effect on core networks—that in fact, they have a negative one—also inaccurate?

Hampton: One of the things they identified in 2006 was that the shrinking size of core networks was the result of a

visit a public park or plaza and 45% more likely to visit a café. Let me play devil's advocate: Isn't it possible that Internet users visiting an Internet café did so because of its primary function, rather than to socialize? That when they visit parks, isn't it possible they do to be surrounded by trees while they surf the Web?

Hampton: The question of whether there's a difference between presence and engagement is complicated. To just summarize: It may be that they do pay less attention to their surroundings. But the activities that they engage in online while in parks and cafés tend to be very good for building social networks. They are interacting with people who are very

the social benefits they are likely to receive from their networks than are other Americans.

CPU: Whether a trend or a counter-trend, there's another unusually interesting series of figures in your report about social engagement and the new electronic media. Your numbers show that an average person who is single, white, and has no children has a 40% probability of belonging to at least one local voluntary group. If he or she owns a cell phone, that probability increases to 54%. If he or she also frequently uses the Web at work and blogs, the probability climbs to 74%. If a person blogs on the Web, there's a 3-to-1 chance that they'll be a local volunteer in some group.

The finding that mobile phone users
are particularly open to non-kin in these networks
is a little surprising. —Keith Hampton

decline in discussion partners from certain places: neighborhoods and voluntary groups. So in that sense, yes, they found that there was less participation in these traditional settings. But then they argued that the Internet was an example of something that drew people away from those settings. What our study shows is that participation in the Internet or mobile phone use does not lead to a decline in participation in those traditional settings. People who use these electronic media are just as likely to know their neighbors by name. They're more likely to belong to volunteer groups. They're more likely to participate in public spaces like parks and cafés. And, in addition, the Web provides a new social setting that also contributes to network diversity.

CPU: Continuing with that theme, your own report contrasted non-Internet users with Internet users, and concluded that the latter were 42% more likely to

diverse, and interactions in those kinds of diverse networks are just the kinds of things we would expect to find in public spaces.

CPU: So, the gloomy picture caused through problematic survey data in 2004 is not completely typical of what we can expect from a society that is growing increasingly sophisticated in its electronic media.

Hampton: True. There are one or two possible conclusions here. First is that the use of this technology somehow inoculates people against a trend toward a decline in the size and diversity of core networks—or this may represent a counter-trend. It may be, as you suggested earlier, a trend toward larger and more diverse networks as a result of using this technology. It's not clear at this point which is true, but certainly those people who are using the Internet or cell phones are better off in terms of

Hampton: So if you're looking for volunteers, you know what your target population should be, don't you?

CPU: Is your survey report then a marketing tool, as much as anything else?

Hampton: I suppose so! The interesting thing about that finding is that we don't know the direction of the relationship. I do think that those people who blog probably increase their exposure to various concepts—and blogging, in and of itself, could be considered a civic activity. It doesn't surprise me that people who have those interests would develop other interests taking part in more traditional volunteer associations. It also would not surprise me to find out that people who are heavily involved in other civic activities feel a need to share that information in some way, such as through a blog. **CPU**

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A Peek At What's Brewing In The Laboratory

BlindAid Lends A Haptic Helping Hand

Tools for the blind and visually impaired are pretty rudimentary (think Braille and white walking sticks), and even with updates in the last few decades (talking cross-walks, Braille-writing styluses, magnification monitors), there haven't been sweeping technological advancements to foster true independence for visually impaired individuals. Dr. Orly Lahav of Tel Aviv University, along with Dr. Mandayam Srinivasan and Dr. David Schloerb of MIT, have developed a more modern tool that will help the visually impaired through this generation and the next.

The new software system, called BlindAid, uses a computer and a hand-held 3D haptic device shaped like a stylus to enable a user to preview a virtual public area—say, the library, a coffee house, or doctor's office—prior to visiting the place.

Lahav explains that the system is essentially a “high-tech walking cane.” By providing haptic and aural feedback, the device lets users experience new environments while still at home. Then they can create a “cognitive map” that empowers them out in the real world.

The experience is pretty simple. Sitting in front of a computer that has been programmed with a 3D map of a building or room, a user navigates around with the stylus. The stylus informs the user of the surfaces involved via a variety of sensations on the user's fingers. For example, it becomes rigid when the user approaches an immovable structure such as a wall. Beyond touch, the software can be programmed for sounds typical of the environment involved, such as cups clinking on a table, phones ringing, etc.

Dr. Srinivasan has taken BlindAid to the Carroll Center for the Blind in Massachusetts for testing, and results have been promising. One test user was able to successfully explore real-world environments after a few sessions with BlindAid. ▲

Fly The Friendly, Automated Skies

If you've ever traveled by airplane, you probably could write a novel chronicling the shortcomings of the whole process. Messed-up scheduling, being stuck on the runway, lost and/or damaged baggage, gate assignments in far-flung locations from check-in—you name it. To this day, air travel remains inefficient, and a group of European researchers thinks there is considerable room for improvement.

In December 2009, the research team, drawn from a quartet of UK universities and led by Professor Edmund Burke of the University of Nottingham, began a four-year project called “Integrating and Automating Airport Operations.” The project's



A collective of European academics has begun developing software to help automate multiple airport functions, with an eye on efficiency and conservation.

aim is to develop computerized solutions to the mess we currently face. Manchester and Zurich airports will also contribute by offering expert advice and feedback.

On the researchers' plate is the study of nonsynced airport functions, such as the take-off and landing schedules, gate assignments, and baggage handling. Once fully reviewed, the team will get busy offering efficient, automated solutions. Burke notes that those in the airline industry recognize that automating just one of the areas of their study would be tremendous progress. Successfully doing this for all four could yield considerable financial and environmental benefits (not to mention more satisfied customers).

The software system Burke and his group are developing won't be complicated for an end user to plug in. “We develop custom algorithms using state-of-the-art optimization techniques. These will be designed to run on standard desktop PCs to avoid the necessity for expensive hardware,” explains Dr. Jason Atkin, a Senior Research Fellow at the University of Nottingham School of Computer Science.

Each university will tackle separate issues and come together during the project to combine their findings. “At Nottingham, we intend to start by modeling the takeoff, landing, and gate allocation problems, along with the ground movement problem that links the three problems together,” says Atkin. “The aim of this project is to gain a better overall result by linking the problems together so they have to be considered simultaneously. Other universities involved in the project will simultaneously consider the multi-objective nature of the problem, the baggage-handling and the user-interface issues.”

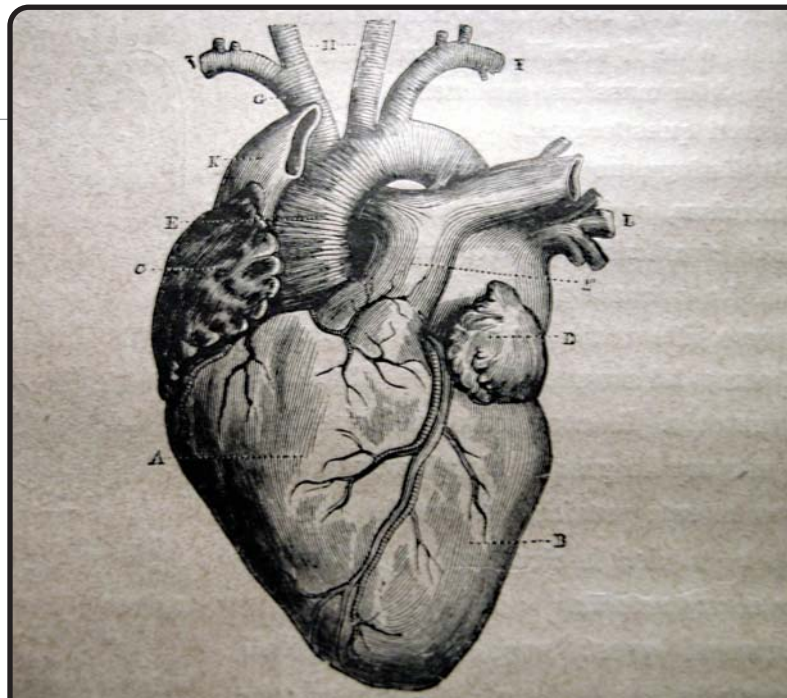
As far as future commercial availability, Atkin remarks, “We are a research organization and are primarily interested in the research side. However, as we have done in the past, we would be interested in utilizing the technologies later in a marketable package, for use at the airports with which we are working, or others worldwide. Obviously, this research has to consider the real problem and be relevant for the airports, so we would be surprised if the airports would not be interested in implementing it eventually.” ▲

New AI Software Gets To The Heart Of The Matter

Endocarditis, an inflammation due to infection in the interior layer of the heart that usually involves the heart's valves and sometimes spreads to the chambers, is serious business for those with medical devices embedded in their hearts. Mortality rate in patients with endocarditis is about 20%—even with assertive intervention; if any other complications arise, rates can shoot up to 60%. Even diagnosing the problem, which requires sending an endoscope down the esophagus to record and echocardiogram, carries risks.

But now, researchers at Mayo Clinic, led by infectious disease specialist M. Rizwan Sohail, M.D, have found a new way to diagnose the illness without disturbing a patient's body. They've tested a program called ANN (artificial neural network) that can be trained to study and evaluate a patient's symptoms. From the patient's data and what is known about the disease, the program can then make a diagnosis.

Results thus far have been good. After Sohail and his team fed ANN information from 189 historical cases of endocarditis, the software was able to correctly detect and diagnose (with a confidence level of greater than 99%) nearly all of the cases entered into its database. Also, when tested on a larger sample of known and unknown cases, ANN was able to screen out about half the endocarditis patients, thus saving the other half, in theory, from painful testing for something they didn't have. ▲



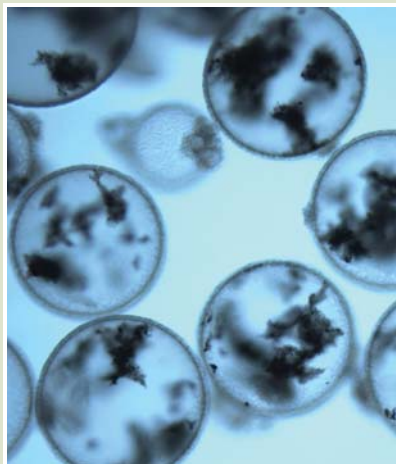
Mayo Clinic scientists hope to save lives and avoid unnecessary interventions for patients with endocarditis by using new artificial intelligence software that can diagnose the infection based on a patient's medical data.

Carbon Nanotubes To Be Bandages For Your Electronics

The momentary inattention, the bobble, and the cringe—nearly all of us have experienced the run-up to a cell phone or laptop crashing to the floor. Then, in the aftermath, the routine becomes a deep sigh, checking for damage, and hoping against hope that you haven't totally trashed your go-to tool of choice. Researchers at the University of Illinois Urbana-Champaign have felt your pain and are looking to heal it, as it were.

Project co-leads Professor Paul Braun (materials science and engineering) and Professor Jeffrey Moore (chemistry) have been working on materials that can self-repair electronics' circuits when they've cracked or failed due to some stressor (such as blunt impact).

Encapsulating carbon nanotubes (which very handily conduct electricity) in 200-micrometer diameter, round polymer capsules, the team has shown that when the capsules are ripped open, the nanotubes work well in flowing into



University of Illinois researchers have been working with self-healing materials for damaged electronics comprised of carbon nanotubes encapsulated in tiny polymer orbs.

and filling the holes in the damaged circuit, thus allowing electrical currents to flow again.

Mary Caruso, a graduate student working on the project, discusses the future of their research. "The next step is for these capsules to be incorporated into a layered device to be tested. The capsules will release the nanotube suspensions into the crackplane of the device when damaged," she says. The team will be comparing the electrical flow through the conductive layer before and after introduction of the nanotubes, hoping to see good restoration of the current.

As far as availability of their work, Caruso explains that the team is still in the early stages. "For computers, the capsules would have to be scaled appropriately in size to be incorporated into small areas and remain undamaged until the moment the damage/failure occurred," she explains. "Since we are still in the preliminary stages of this work, we predict it will be another five to 10 years until this type of technology is used in computers." ▲



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Lannihilation - Calgary, AB, Canada

www.lannihilation.ca

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lanifesto.org

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www.CarolinaGamesSummit.com

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www.lanmaniac.com

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ClanUSEast 2010 - Laughlinton, PA

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www.sgxlan.com

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Q&A With Joe Macri

Prepare Yourself For Cool Fusion

Only a few days after this interview with AMD Client Technology CTO Joe Macri, Intel announced that it would “delay” the launch of its much-awaited Larrabee graphics technology for consumers. The unexpected turn raises the stakes for AMD’s even more anticipated melding of its CPU and GPU cores into a new processor known as “Fusion.” Fusion is Macri’s baby. In addition to being a long-time JEDEC chairman and former director of technology at ATI, Macri is now the point man when it comes to envisioning the future of AMD’s desktop and mobile efforts.

Q Intel went to a multichip module design as an intermediate step to CPU/GPU integration. Why didn’t you?

JM Because there’s no value in it. We still have a PCI-Express bus between the two chips. But putting them on a single die now allows us to share a memory system. And that’s really key—having all of the memory be accessible by all of the compute units.

Q You’re saying there’s no added value with Intel’s new Clarkdale design?

JM There are a couple of approaches for the memory system. You could hang some memory off the GPU, or you could hang it all off of the CPU and do all your requests through PCI-E. On one hand, you have two memory systems, which is hard to manage and inefficient. You’re going to be bottlenecked by your PCI-E bus, which is a very long latency bus with limited bandwidth. With Fusion, the first thing we do is share the memory system. You eliminate that PCI-E bottleneck, and you eliminate the many copies that go on with separate GPU and CPU memories.

The challenge is [managing] that memory. You have two types of reference streams. The first are reference streams that are very low latency from the CPU because the CPU stalls very quickly. So when you go all the way out to DRAM, you’re now at a level of memory that has so much latency that it’s very difficult to

hide. Then, regarding the vector [graphics] unit, we have the ability to hide tons of memory latency. We’re generating thousands of memory references, reordering them all so they map into the bank-style architecture of a DRAM, and optimizing them such that we’re getting the memory bandwidth as close to peak as possible and sustaining it. You can now efficiently intertwine those low-latency and high-bandwidth requests to use memory in the best way possible. It would be very difficult to do that in separate chips. The Fusion memory controller is a key piece of the design that moves very quickly between servicing demands from the CPU to keep it from stalling but also keep that vector unit fed so that we get that 10 to 20X efficiency factor over a scalar CPU.

Q What will this improved efficiency mean in the real world?

JM Well, the apps that’ll be written going forward are going to be pretty incredible. One of the biggest areas that will benefit is the user interface. We’ve had a very static UI for over 30 years. It’s basically a keyboard, mouse, and display. The biggest PC these days is the automobile, but it has a UI that’s not a traditional keyboard. And it is just now becoming usable: You don’t have to say the same command 27 times. With more compute capability, the UI is going to be able to



continue evolving in a way that is much more natural for people to use. The computer will become something that you don’t get trained on; instead, it reacts to you. This is a key piece of the AMD vision. We want hardware to be much more intertwined in your life and be reactive rather than the human getting trained to use it.

Q Are Fusion and Larrabee two paths to the same place?

JM There are similarities and differences with Larrabee. I think the software model between the two will be close enough that the programming will be similar. What’ll be different is the performance we get out of each one. [Intel] has made some decisions that I think they’re going to have to undo because they just didn’t have the vector experience that we had. Over time, I think they’ll clean those things up. When you get a factor of 10 to 20, you just have to react to it, and that’s what our competitor did. Fusion was the reason for purchasing ATI. This isn’t a reactive type of thing. This is part of the plan. And if you don’t have the capability to do this type of merged device, it’s going to be very difficult to play in this game. ▲

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